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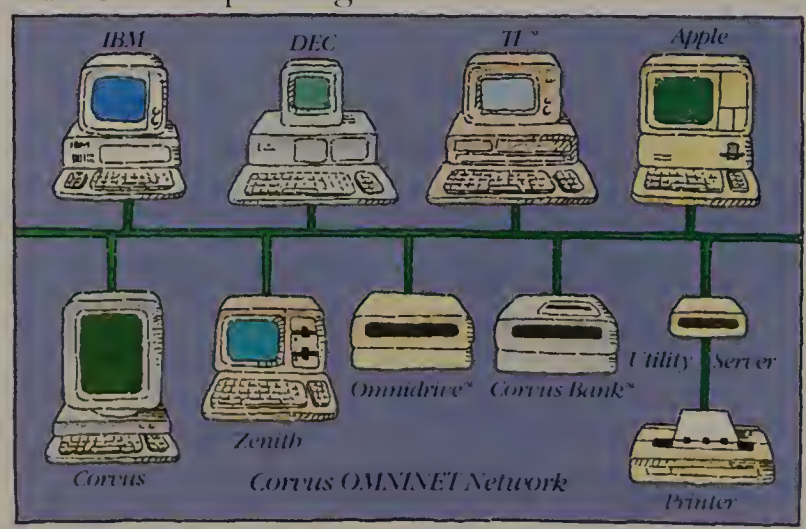

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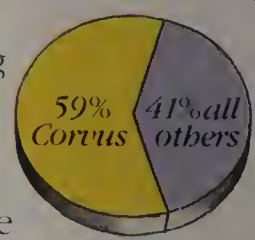

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Volume 3, Number 1
January 1985

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PC World™ (ISSN 0737-8939) is published monthly except semimonthly in March, June, September, and December at $28 for one year (16 issues), $48 for two years (32 issues), $68 for three years (48 issues) by PC World Communications, Inc., 555 De Haro St., San Francisco, CA 94107. Additional postage outside the U.S. and Canada $30 per year surface mail, $130 per year airmail. Outside the U.S. all orders must be prepaid in U.S. funds drawn on U.S. banks. For questions regarding subscriptions and to place subscription orders call toll-free 800/247-5470 (in Iowa: 800/532-1272). Second-class postage paid at San Francisco and at additional mail offices.
POSTMASTER: Send address changes to PC World, Subscription Dept., P.O. Box 6700, Bergenfield, NJ 07621. Editorial and Business Offices: 555 De Haro St., San Francisco, CA 94107, 415/861-3861.
CompuServe 74055,412
The Source STE908
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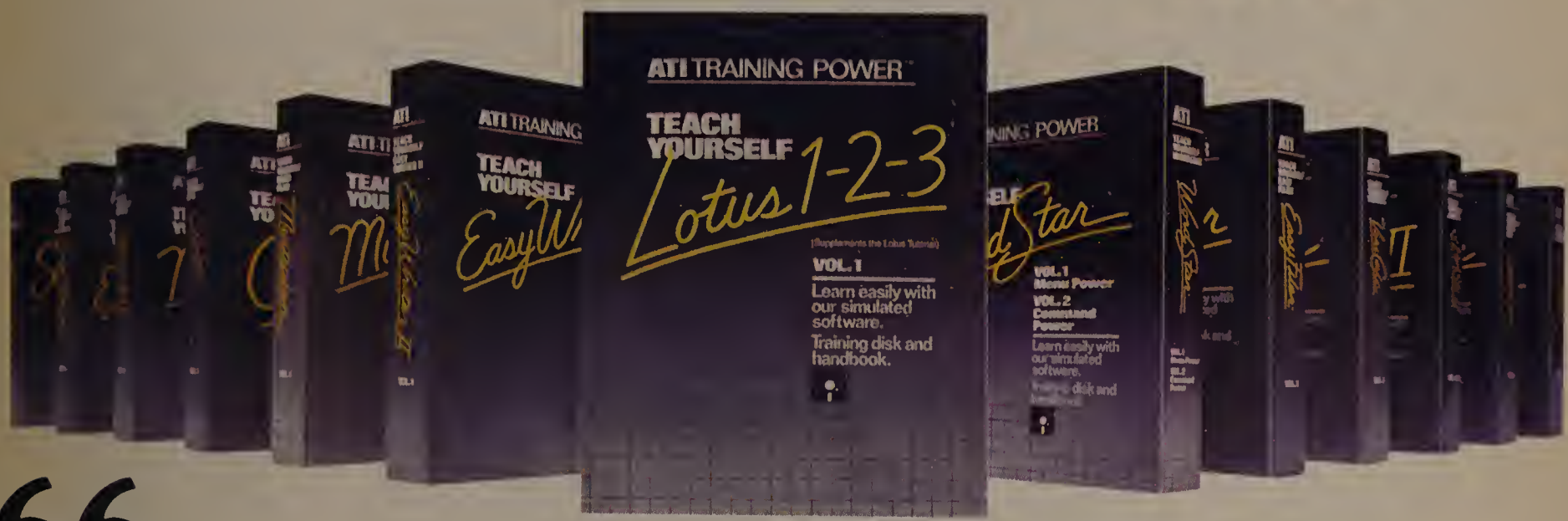

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Surveying the PC Marketplace

David Bunnell

A new PC World subscriber survey reveals who our readers are and tells us what they think is important—to buy, own, and use.

Now that *PC World* has been around for two years, the personality traits of our readers are starting to emerge. *PC World* subscribers are still a diverse group, but they all have at least two things in common: They are high achievers and use IBM or compatible personal computers. A recent survey conducted by Erdos and Morgan helped us shed a little light on our *PC World* melting pot and the IBM audience.

Our subscribers have some impressive credentials. Samples from a broad cross section of subscribers in businesses, industries, and professions revealed that 90 percent of *PC World* readers are employed as executive professionals and managers, 34.9 percent hold postgraduate degrees, and the average individual income is $52,821.

The IBM Personal Computer has achieved a strong presence in the corporate world; according to our survey 85 percent of our readers own or use an IBM PC. Big Blue has captured quite an influential following, since 40 percent of our subscribers work in corporations with gross sales or revenues of over $100 million. Our readers' entrepreneurial spirit as well as corporate professionalism is revealed by the 27.5 percent involved in companies valued at under $1 million.

IBM is not the only major influence on our audience, though; Compaq computers are the most popular compatibles owned or used by our subscribers. The breakdown of compatibles users shows that 13.4 percent own or use Compaqs, while only 3.8 percent own or use Columbia-brand compatibles and 1.6 percent own or use Eagles. The results also show that one computer is not enough to satisfy our readers' needs: 34.8 percent say they own or use three or more personal computers, 81 percent for use at work and 70 percent for use at home.

Our readers have clout in the PC marketplace. An amazing 61 percent report that they supervise

or are involved in the procurement of computer hardware and software for their companies. During the next 12 months, 66 percent of these micro experts expect that their companies will buy personal computers, and 31 percent plan to buy a PC for their personal use.

Despite the gloomy predictions of the industry's economists, the personal computer market is obviously still going strong. The number and variety of computers on our readers' shopping lists are remarkable: 84 percent intend to purchase IBM or compatible desktop computers, 34 percent are considering transportable models, while 5 percent are evaluating PCjrs. The survey results bode well for the peripheral market as well: over half of those individuals or companies planning to buy personal computer equipment are checking out hard disk drives; 43 percent are looking at modems; and 40 percent are considering color monitors. So much for the crash of '84.

Our readers' responses not only foretell considerable computer sales, their preferences point to a trend toward more powerful and flexible systems. We can probably expect a growth in on-line systems and business graphics. That an incredible number of companies are planning to network their systems is indicated by the greater than 20 percent of our subscribers who say they or their companies are considering network hardware and software purchases. The bottom line is that our audience represents and influences a huge, dynamic marketplace.

While many enterprises will not survive, much less succeed, in what has become a brutally competitive environment, pessimistic observers need to refresh their view of the future with an occasional peek through a PC Telescope. It is clear from this *PC World* subscriber survey that as the power and the use of personal computers grow, all facets of the market are affected. For example, as hard disk storage becomes a PC standard, it will trigger a burst of activity in software development and add a whole new dimension to the general use of personal computers.

Big Blue's recent move into the software realm might seem intimidating, but even if IBM corners the top four or five categories in a major way, there will still be a huge market for new PC software from other publishers. There are already 11 categories of software that more than 15 percent of our readers say they or their companies are planning to buy. These include investment/financial management (16.2 percent), networking (21.1 percent), profession/industry specific (23.4 percent), accounting (19 percent), education/training (22.1 percent), communications (35.5 percent), graphics (32.6 percent), integrated applications (32.8 percent), data management (38.6 percent), spreadsheet (39.2 percent), and word processing (41.4 percent).

The personal computer is continuously being revised and improved. We can expect several generations to pass before we have the ultimate PC model with enough longevity and versatility to be a standard for even ten years. As the nature of the machine changes, the profile of those using personal computers evolves as well. It was encouraging to note that the number of female subscribers (11.4 percent) has almost doubled since last year's study. I want to thank our subscribers who responded to this survey, and I hope that sharing it with all our readers will be of some value to the PC community.

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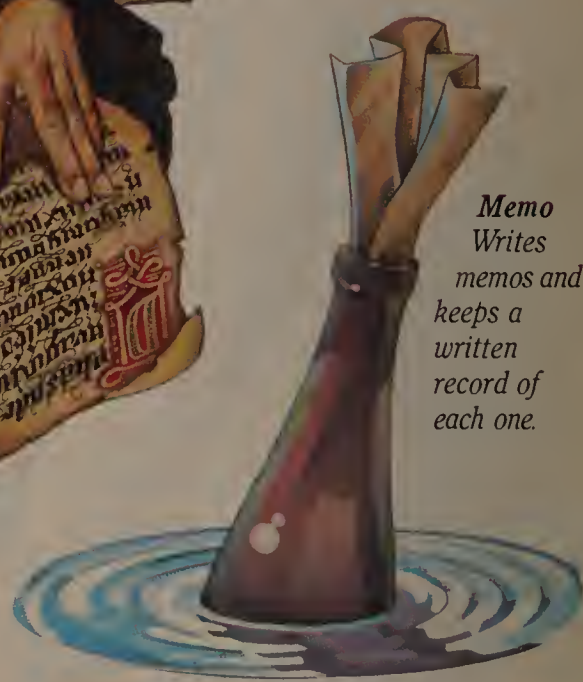

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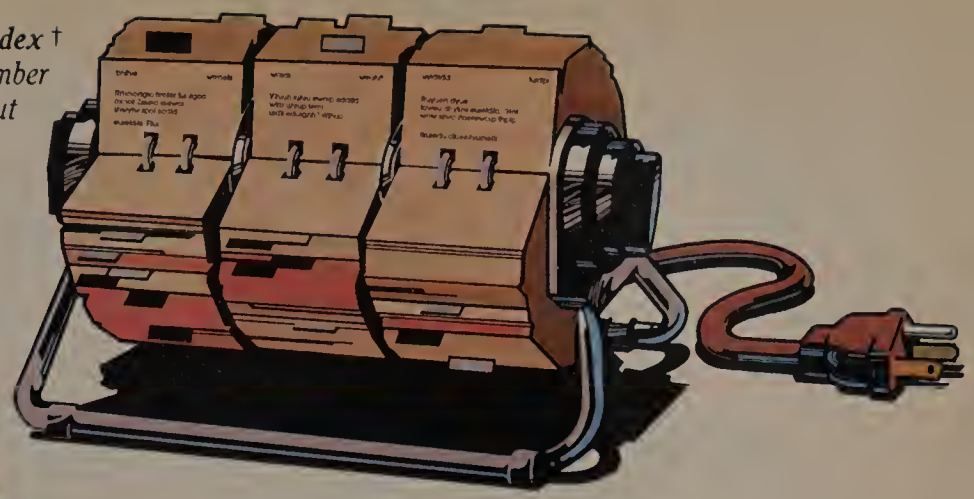

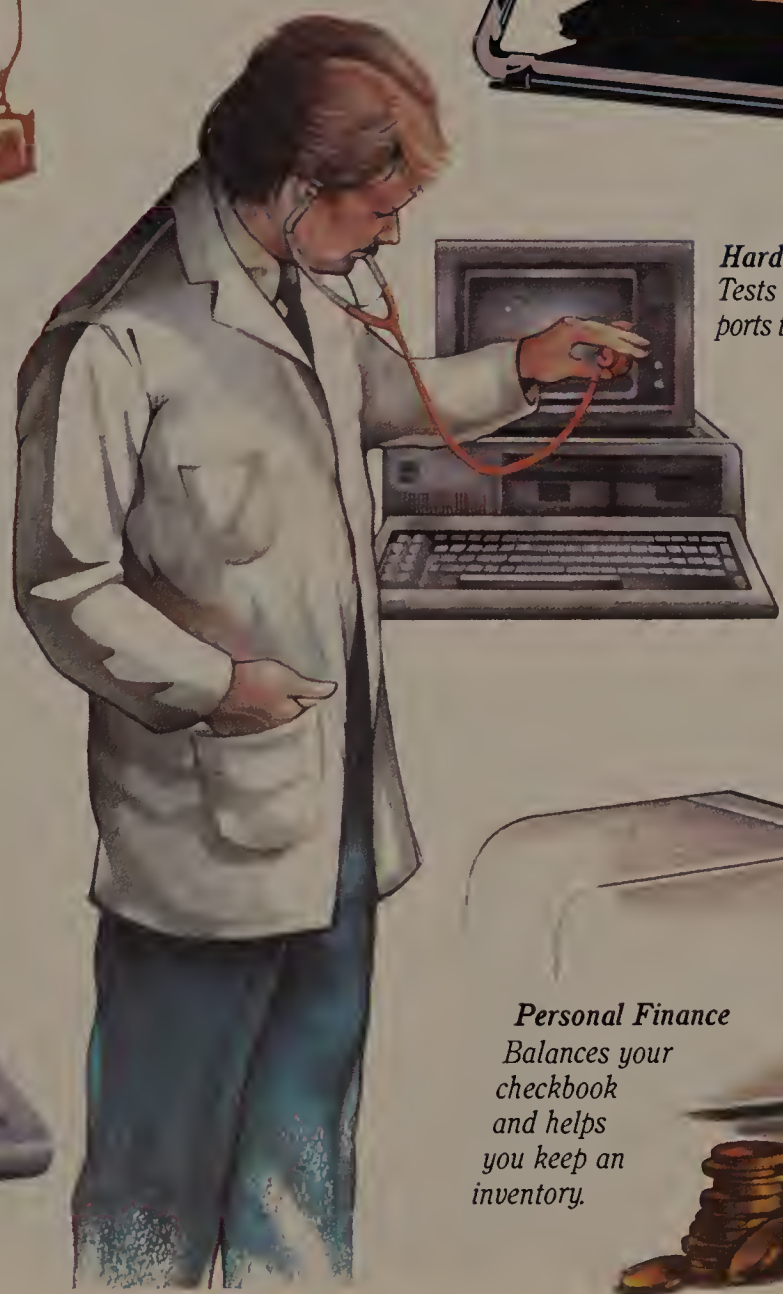

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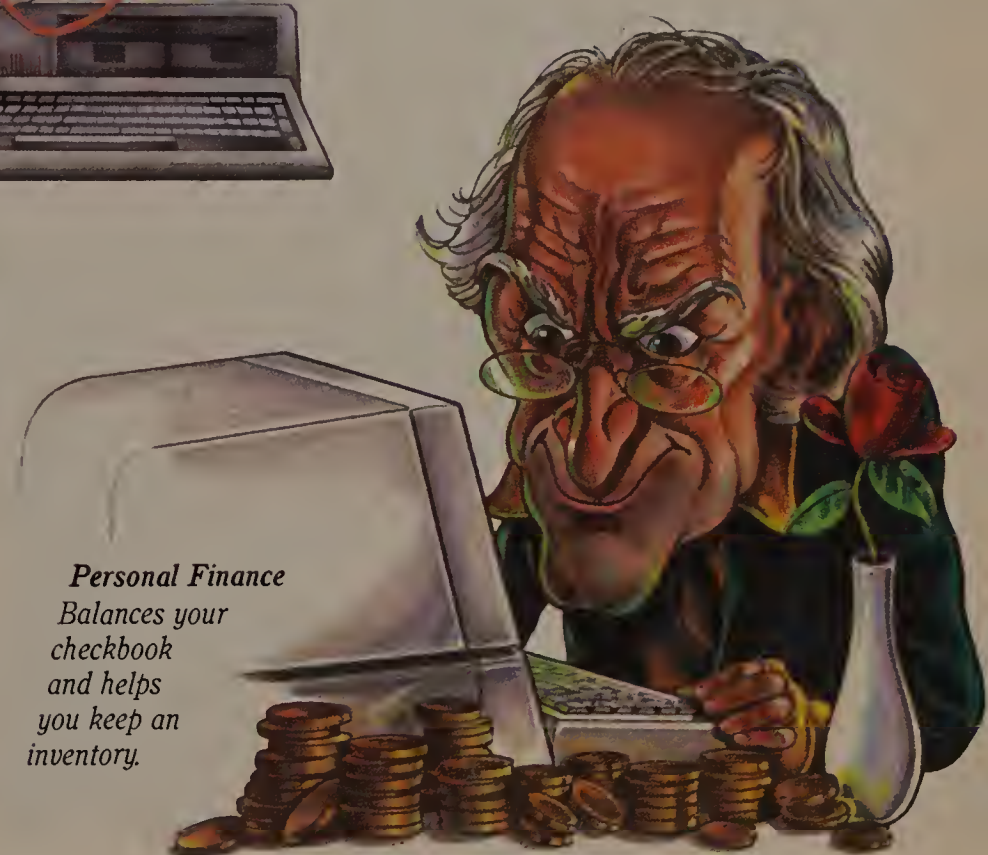
Tests your PC's memory and parallel ports to stop problems before they happen.



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Letters

Reactions and responses from the PC World community

Long-Distance View

This letter is in response to David Bunnell's recent column "Does AT&T Still Ring True?" [*PCW*, Vol. 2, No. 11]. Mr. Bunnell obviously sees AT&T's PC through a tunnel. Networking and decentralized processing are becoming popular with businesses as centralized processing costs rise. Networking is also one of AT&T's greatest strengths, with the new PC fortifying the weakest link—computer terminal equipment. Why use extensive R and D resources to compete in an overcrowded PC market? Mainframe/mini/micro integration is a substantial market that AT&T plans to fill, with UNIX a key player. The one-time telephone giant intends to become a communications giant.

Tommy Maruaso
Arlington, Virginia

Waiting for ROM Keys

So John Swanson isn't going to release his company's engineering analysis program to the PC market because PC manufacturers won't build in a ROM serial number for software protection ["Piracy and ROM Keys," *Letters, PCW*, Vol. 2, No. 11]. Somehow I don't feel threatened. If Mr. Swanson's program is worthwhile, some other software company will undoubtedly come out with a package that does the same thing on PCs. For every company that chooses to stay out of the PC market because of the lack of built-in "protection," there are ten or a hundred more willing to compete with essentially the same program.

Mr. Swanson notwithstanding, David Bunnell's comments on the foolishness and futility of trying to build software protection into microcomputers were hardly a disservice to the industry. Indeed, they were very much to the point. In addition to the problems of cost and manufacturers' reluctance, there are a couple of other problems with the idea that Mr. Bunnell didn't mention.

First is the problem of standards. Anyone who seriously thinks that the hundred or so manufacturers out there can agree on the kind of number to assign to each computer and where to put it hasn't had much experience with microcomputers.

The second problem is that such a system is a royal pain to users. The Fortune 1000 companies Mr. Swanson sees as so important will tolerate this kind of nonsense, but that doesn't mean they like it, and smaller firms and ones that know more about microcomputers will be much less willing to go along. Mr. Swanson's contention that manufacturers will have to include such protection because Fortune 1000 companies insist on dealing with "established software houses" is wishful thinking. How many executives in the Fortune 1000 had heard of Software Arts when they started snapping up *VisiCalc?*

The final, and the most damning, problem is that this kind of hardware protection scheme isn't secure. A knowledgeable programmer can defeat such a scheme by tricking the program into thinking it is running on the right computer. And it takes only one knowledgeable programmer who is willing to spread the word to make this sort of thing worthless.

Anyone who decides to wait to enter the micro market until there is a foolproof method of protecting programs had better settle in for a long wait. The answer to program stealing is not copy protection but reasonably priced software with adequate documentation. The manufacturers who understand that will be the ones who succeed in the next phase of the software business.

Rick Cook
Phoenix, Arizona

Last-Minute Changes

After reading all the favorable reviews of *ThinkTank* (including the one in *PC World* ["ThinkTank," *PCW,* Vol. 2, No. 2]), I purchased a copy of the program. I found the copy-protection scheme outrageous! Maybe my brain has turned into lime Jello from staring at the video screen, but I don't remember any review I read discussing the protection scheme I found on *ThinkTank.*

I went to my growing stack of back issues of *PC World* to re-read the review, and sure enough, there it was: "Those with little experience on the PC will appreciate the simplicity of copying DOS onto the *ThinkTank* disk." Not on my disk!

On the contrary, the only way to boot up *ThinkTank* version 1.000 is to use a separate DOS disk. The disk swapping is ridiculous. And forget about using *ThinkTank* with a RAM disk; it doesn't work unless the master is in drive A:. The same is true using a hard disk.

I saw similar comments about the lack of copy protection and the difficulty in writing DOS to the disk in several magazine reviews. I don't think the reviewers were lying, but I am curious about the nature of the preproduction copies of software that are given to magazines for evaluation.

Joseph J. Pasky
Scottsdale, Arizona

PC World *occasionally reviews prerelease versions of software. The manufacturer of* ThinkTank, *Living Videotext in Palo Alto, California, informed us that the evaluation copy of* ThinkTank *was very close to the final version.*

The manufacturer states that copy-protected version 1.001, an upgrade to version 1.000 released in February 1984, lets you copy DOS onto the ThinkTank *disk and copy* ThinkTank *onto a RAM disk or hard disk. You can update version 1.000 free if you have already sent in your registration card or if you register now when requesting version 1.001.* PC World *makes a point of stating whether a program is copy-protected when we are aware of this fact.–Ed.*

Not FORTRAN's Fault

I am writing to inform owners of the IBM version of the UCSD p-System that there is a bug in the program if you use it with the FORTRAN 77 compiler. The compiler cannot handle the uses of adjustable array dimensions in a call to a subroutine.

Upon discovering this problem, I informed IBM and was told that they had no plans to release a p-System revision. Meanwhile, I contacted SofTech Microsystems, another company that manufactures a UCSD p-System FORTRAN 77 compiler, and was told that as of November 1983 this problem had been resolved in their compiler.

I recommend that all owners of the IBM version of the p-System complain about the lack of support. I think it very unfair that in order to have the UCSD p-System FORTRAN 77 compiler run properly, you have to purchase a new compiler from SofTech Microsystems. Charging a nominal fee to revise the compiler is more acceptable than forcing users to purchase a new compiler.

V. P. Mangiacapra
Bridgeport, Connecticut

Strokes for Jr

In reference to Mr. Gene Doremus's letter ["Jr Canine," *Letters, PCW,* Vol. 2, No. 9], why are so many people so narrow-minded when it comes to a new computer? The PCjr is not a dog, it is an IBM home computer. What other machine sells for $1000 and has as much support? It is expandable to 640K, and additional disk drives–hard and floppy–are available. It runs business programs, including *1-2-3* and *Symphony,* as well as home programs.

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Circle 77 on reader service card

PCjr has 640K, using Tecmar jr-Captain and jr-Cadet boards, a Riteman A-1 printer, a Panasonic RGB monitor, and a Key Tronic KB5151jr Keyboard. I will be adding a disk drive and a modem as soon as I find the ones that suit my needs. The cost for hardware so far is about $2500, including the PCjr.

P. C. Kaiser
Englewood, Colorado

Oops

Katie Seger's article "Plug In More Power" [*PCW*, Vol. 2, No. 9] is an admirable concept blown by sloppy implementation. The statement "the only tool you need is a flathead screwdriver" isn't quite true. You also need a mirror for Figures 2, 3, 5, and 7, because the photographs were published flipped. Unfortunately, the PCjr owner who needs this article to install boards probably won't realize that some of the photos were reversed.

George T. Preston
Palo Alto, California

Anybody Out There?

This past spring I read a favorable review by Keith Richard Cook of a disk magazine called *Mentor* ["Direct to Disk," *PCW*, Vol. 2, No. 3]. The review mentioned a special introductory offer of two *Mentor* disks for $14.95. I was intrigued and sent in my check for two disks and additional subscription information. Although the company cashed my check, I never received either the disks or the subscription information–even after a second request. I hope this incident is an isolated one.

John Clarence Chinn
New York, New York

Mentor *is no longer being published, and the company is no longer accepting orders. However, they assure us that all orders received for introductory issues will be filled as soon as possible, and they apologize for the delay.–Ed.*

FORTH and BASIC

I read with interest Martin Knebel's letter ["Prime Point," *Letters, PCW,* Vol. 2, No. 10] in response to my article "Four FORTHS" [*PCW,* Vol. 2, No. 5] regarding his timings of FORTH and Compiled BASIC.

Mr. Knebel suggests that his is a "true" comparison, in contrast to the one between FORTH and Interpreted BASIC. My comparison seems as valid as his. I compared the performance of FORTH in common use against that of the BASIC in common use–Interpreted BASIC.

Even on the grounds Mr. Knebel defined–comparing two compiled languages–I do not think his comparison is valid. The FORTHs that I tested compile only to an intermediate level, a kind of p-code, whereas the BASIC compiler, like some FORTHs available, compiles all the way down to machine code. A true comparison on this ground would include one of these FORTH compilers–not the FORTHs in the review.

I think people want comparisons of products that are commonly available and commonly used. And since Interpreted BASIC and the FORTHs I reviewed fit those criteria, and since both offer the interactive development environment that most programmers prefer, the comparisons as published seem to be as true as any.

Michael Ham
Santa Cruz, California

Corrections

Our company and its products were mentioned in "Professional Presentations" [*PCW,* Vol. 2, No. 9]. Unfortunately, some of the information was incorrect. Our products, *PC-Title* and *PC-Projector,* are sold as one package for $49.95. The correct company name and address is PC Resources, Inc., 620 Hobart Terr., Santa Clara, CA 95051, 408/242-4169.

Tom D. Hall
PC Resources, Inc.

Please correct our address as it appeared in the September 1984 issue of *PC World* ["Blackout Backups," *The Help Screen, PCW,* Vol. 2, No. 10]. The correct address is SAFT America, Inc., Electronic Systems Division, 2414 W. 14th St., Tempe, AZ 85281, 602/894-6864.

Rod Pullen
SAFT America, Inc.

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persoft

"The Compatibles Line Up" [*PCW*, Vol. 2, No. 4] had a few pertinent errors regarding the STM product. The product name should have been the STM-PC, not the STM Pied Piper. Also, although a few customers may wish our price were $3000, it is $3449. Last but not least, our product boasts a 25-line LCD, not a 16-line LCD.

Lisa Williams
President, STM Electronics Corporation

In "Interactive Video: Calling the Shots" (PCW, Vol. 2, No. 11) we failed to give credit where credit was due. The third and fourth photographs on page 103 of the article were taken by Roger Burnard, a professional photographer and biology professor at Ohio State University. The shots were commissioned by Videodiscovery of Seattle, Washington, for their Bio Sci Video Disk *program.* PC World *regrets the omission.—Ed.*

Letters should be mailed to Letters, PC World, *555 De Haro St., San Francisco, CA 94107, or sent electronically to MCI Mail PCWORLD, CompuServe 74055,412 or The Source STE908. We reserve the right to edit letters. Letters should not exceed 300 words.*

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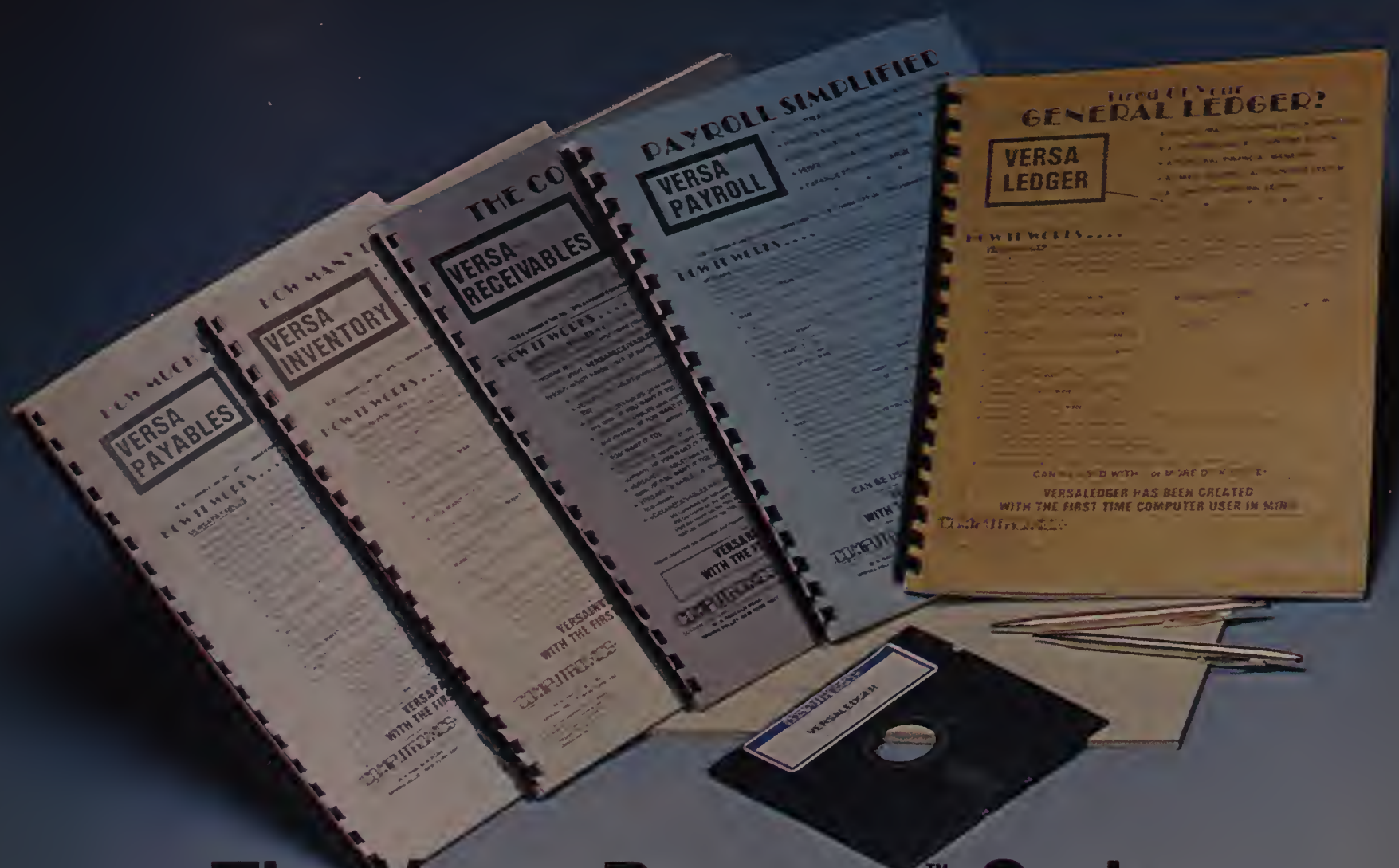

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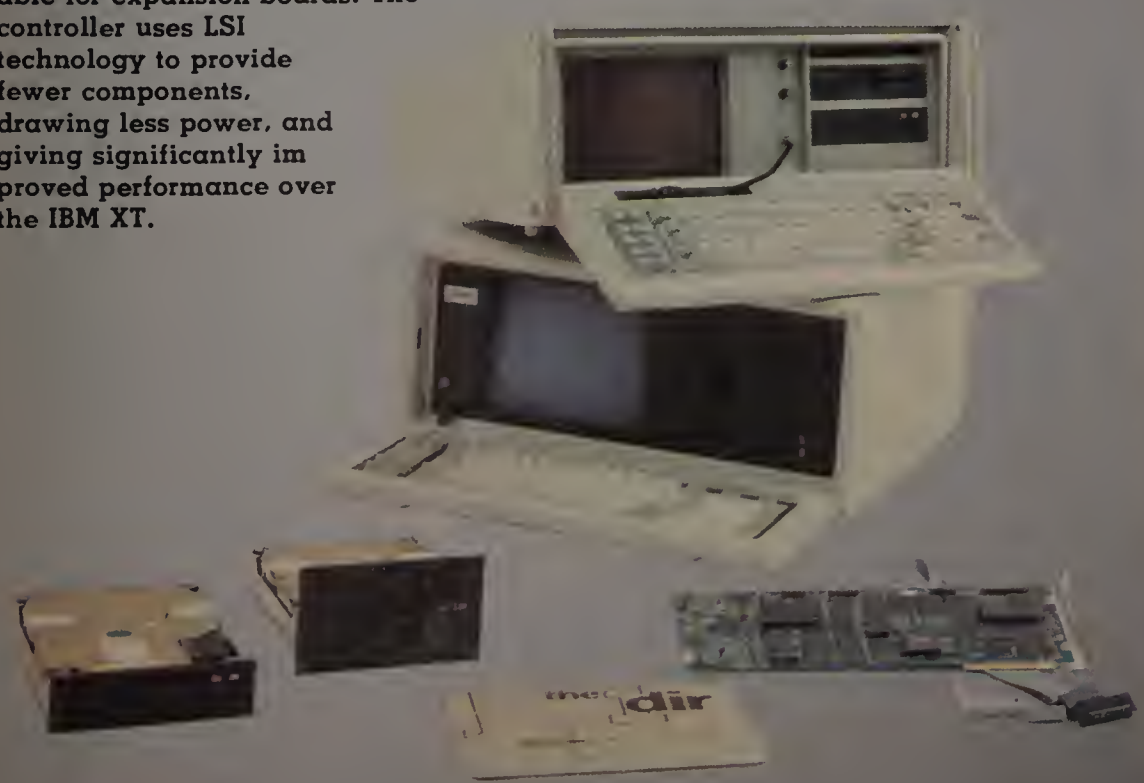

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PC WORLD

Break Dancing in Budapest?

Michael Katz, president and CEO of Epyx Computer Software, won't be surprised if Hungarian computer programmers study American fads and events and incorporate them into successful computer games. Epyx, the Sunnyvale, California, game manufacturer, has cashed in on such trends and events as break dancing and the Los Angeles Olympic Games, incorporating them into new computer games.

Capitalizing on current trends was one of the tips Katz gave when he addressed approximately 200 software programmers in Budapest last summer. Katz described the audience as programmers who either work for or are interested in working for Novotrade, a government-sponsored software firm, and freelance programmers. He spoke to the group at the invitation of Andromeda Software, a London-based company that creates arcade-style computer games for European software publishers. Andromeda acts as an agent for Novotrade.

Michael Katz

Katz described Hungarian computer games and animation as "prosocial," with much of the work based on national folklore and fables. "It's nonaggressive and nonviolent," he said. "It's very nice and positive, but it wouldn't cut it in the United States market. That was the purpose of my trip—to tell them what our standards are."

Katz also said that the games he viewed were less sophisticated than American-made games in elements such as graphics and sound effects. But he stressed that the games were "coming along." He thinks that the Hungarians will be able to overcome technical difficulties as well as more challenging cultural differences. "They can pay someone to watch United States trends," he said. "Once a perceptive marketer is aware of these things, he or she can act on them."

PC World View *reports new developments in computer technology, items of interest to computer enthusiasts, and the most significant and enticing speculation about industry trends and personalities. We've reserved the "Grapevine" section of this column for industry reports that are still at the speculative stage.*
—Katie Seger

View

News and notes for the computing community

Potential Member of the Family

Sytek could become more than an IBM supplier. The two companies have signed an agreement that allows IBM to buy stock in the Network parts company.

In a move that appears to mirror its business dealings with Intel and Rolm, IBM purchased a $6 million convertible debenture from Sytek in early September. Although the details of the agreement are confidential, Sytek's president and CEO, Michael S. Pliner, said that the debenture gives IBM the option to take up to a 4.9 percent stake in the Mountain View, California, company. Sytek, a privately held company, supplies the boards and translator units for the PC Network that IBM announced in August.

Pliner said he sees the move as IBM's "vote of confidence" in his company, but he would make no comment about whether or when IBM might exercise its option. Many industry watchers think that IBM will repeat the action it took with Intel and Rolm, two suppliers that Big Blue subsequently invested in. At present IBM owns 20 percent of Intel and recently acquired 100 percent of Rolm.

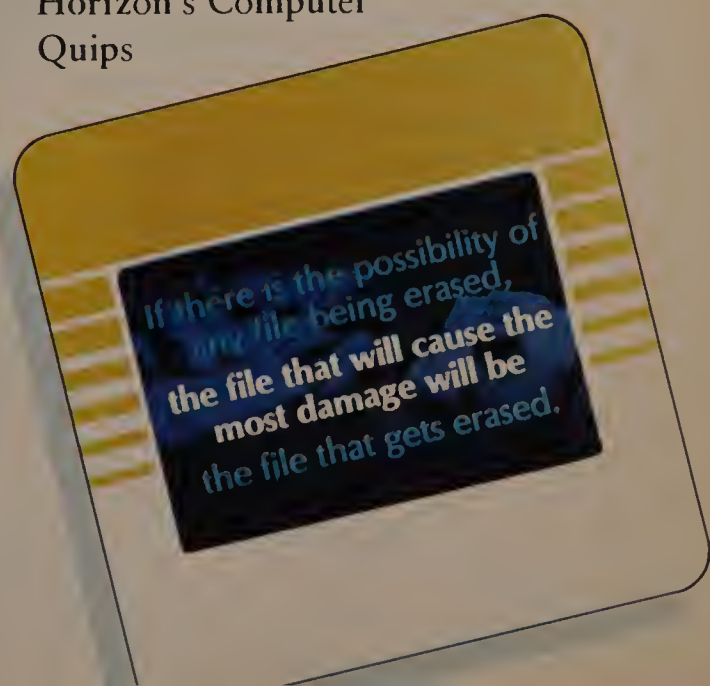
One analyst, though, thinks that IBM will play it cautiously. Melody Johnson, with the Seattle brokerage firm Cable, Howse, Ragen, said that buying a stake in large companies like Intel and Rolm is different from investing in a smaller company like Sytek. She thinks that IBM will wait to judge Sytek's dependability as a supplier before exercising its option. Johnson expects Sytek to go public within the next 12 to 16 months, "given good market conditions." She added, "Being a supplier to IBM will help Sytek's public offering."

Slide One By

The computer revolution touches many people in the industries served by Visual Horizons, said company founder, Stanley Z. Feingold. Visual Horizons, for 15 years manufacturer of audio-visual materials, ships six million slides a year to its educational and business customers.

"Customers kept asking for some humorous, computer-related slides," Feingold said. And so, "Computer Quips" were born. The set of 20 35mm slides (see Figure 1) pokes fun at the high-tech world of computers and software. The Quips, which include such on-the-money axioms as "A bug will not appear until a program has passed final inspection" and "Any given program, when finished, is obsolete," were introduced last summer. Thousands of Quips were sold in their first months of availability, Feingold said.

Figure 1: One of Visual Horizon's Computer Quips



Private Parts

In a bid to maintain its marketplace lead and keep its franchisees happy, ComputerLand announced a new line of private-label products. The company has established Sysdyne Technology, a subsidiary incorporated in Hong Kong, to acquire and supply the products to the computer store chain.

The first products announced are all IBM compatible and include three monitors, a hard disk drive, a floppy disk drive, cables, and surge suppressors. ComputerLand officials acknowledged that half their products will come from overseas manufacturers but declined to give more details. *PC World* has learned that the 13-inch RGB/green/amber monitor is made in Taiwan, and the 12-inch monochrome green and 12-inch monochrome amber monitors are made in Korea. The Sysdyne products are expected to be competitively priced, while allowing dealers a 40 to 50 percent markup.

In another marketing area, ComputerLand scored a nice coup by signing tennis star Martina Navratilova to a three-year contract. The almost-indomitable Navratilova, who has won six consecutive Grand Slam singles titles, certainly fits in with ComputerLand's "There's Only One Number One" television advertising campaign. According to a ComputerLand spokesperson, Navratilova uses a personal computer to plan her strictly regimented diet.

Navratilova and ComputerLand chairman William Millard met at last year's U.S. Women's Indoor Tournament in Livingston, New Jersey, where ComputerLand was a sponsor. The tennis star's contract calls for her to wear a ComputerLand patch during tournaments and to appear in "tennis tips" commercials for the retail chain. She will also be featured in point-of-purchase advertising.

Big Blue's News

In a reorganization last summer that a spokesperson described as "more internal than external," IBM "realigned" its World Trade Europe/Middle East/Africa Corporation into five operating units, each divided into 13 business-area management groups. The reorganization should have "no direct impact on customers," the spokesperson said.

Four of the units—France, Italy, West Germany, and the United Kingdom—were existing divisions; the fifth unit, which serves the remaining countries in Europe as well as the Middle East and Africa, is headquartered in Paris.

According to a prepared statement, the company "believes that the realignment will increase IBM's responsiveness and competitiveness in a rapidly expanding industry by placing more decision-making authority and staff support closer to the marketplace."

Grapevine

New IBM enhancements for the PC AT may boost the computer's disk storage to more than 100MB. That's the word from an industry source who says that IBM is developing a large-capacity 5¼-inch Winchester drive at its unit in Rochester, Minnesota.

Intelligent Life Found

The IBM booth at the American Association for Artificial Intelligence (AAAI) '84 Conference attracted many curious onlookers, according to Howard Dicken, president of DM Data, a Scottsdale, Arizona, consulting firm that specializes in semiconductors, computers, and artificial intelligence. Not only was the IBM booth one of the biggest of the summer conference, but Big Blue also demonstrated several artificial intelligence (AI) projects in the research and development stage.

"I think IBM wanted to make its presence [in AI] known," Dicken said. He suggested, however, that the larger reason for IBM's presence at the conference was to get feedback. "AI experts from around the world walk by and can tell you if you have a good product." Dicken also pointed out that IBM had researchers rather than marketing division people staffing the booth.

Most IBM products unveiled at the conference were aimed at mainframes, but Dicken sees *Epistle,* an expert system to check spelling, grammar, and style, as "a good candidate for the personal computer market." He said that IBM may also have AT or XT versions of products under wraps.

Dicken noted that IBM was not the first company to produce a personal computer. "It waited to see what the market was like. I think it will follow the same marketing plan with AI products," he said. "IBM will bring out products when there's enough acceptance and when the demand warrants them."

On the Razor's Edge

The Gillette Company has acquired 20 percent of Digital Learning Systems, an OEM software firm best known for two disk-based tutorials, *Exploring the IBM Personal Computer* and *Exploring the IBM PCjr.* The agreement, signed last summer, allows the billion-dollar Gillette Company to acquire the remaining 80 percent of Digital Learning Systems over the next four years.

The deal was another move in Gillette's plans to become a major player in the computer supplies, peripherals, and software markets. It already owns Misco, a New Jersey mail-order computer supplies company, and last spring it acquired 40 percent of Datasoft, a California computer games and education software firm.

Stephen Shapiro, Gillette's director of new business development, said that his company sees computer services as a high-growth business area and is acquiring noncompetitive, nonstart-up computer supplies and software companies. Said Shapiro, "Gillette's strength is in mass-produced, mass-merchandised items. We're looking to position ourselves for the 1990s," when computer supplies and software will also be mass-marketed items.

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Eight indicator lights to display modem status	Yes	Yes
Speaker to monitor call progress	Yes	Yes
Attractive, compact aluminum case	Yes	Yes
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Unattended remote test capability	Yes	**No**
Phone cable included	Yes	Yes
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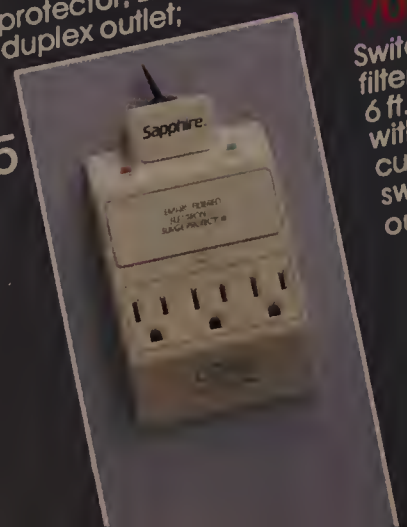

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A1-11

New Dimensions in Word Processing

Current PC word processing software rivals the capabilities of dedicated machines, and adjunct programs such as spelling and grammar checkers, outline organizers, and text data management systems are cultivating new terrain.

Janette Martin

"We speak when we are awake, and we speak in our dreams. We are always speaking, even when we do not utter a single word but merely listen or read." Philosopher Martin Heidegger was obsessed with language as the ever-present basis of self-expression and communication. Whether you consider it a necessary evil or a divine right, self-expression is the soul of the written word. And just as we clarify our speech with qualifiers, illustrations, and repetition, we clarify written language by refining, rephrasing, and restating our thoughts. Communication through writing demands rewriting.

The language of business is generally communicated via the typewritten page. But with a typewriter, the process of revising text is difficult and time-consuming. If you don't have time to retype an entire document after revisions, you must use scissors, correction tape, and white-out to make changes, and a copy machine to get a reasonable facsimile of a polished page.

Enter computerized word processing, and language becomes flexible. On a computer you can create documents and then change text quickly and easily before the final printing.

From the first days of computerized word processing more than 20 years ago, users have been able to perform basic editing functions such as moving, copying, inserting, and deleting text. Changes during the last couple of years, however, signal a dramatic departure from mere editing and printing. Driven by an intensely competitive market, PC word processing is changing from helper to mentor by providing not only editing tools but creative aids to help us organize and even compose what we want to communicate.

A Brief History

Word processing began in the first decade of the twentieth century with the mechanical typewriter, a vast improvement over handwriting. During the 1930s automatic typewriters used paper cylinders coded with repetitive text for reproducing documents. During the 1950s paper cylinders were replaced with paper tape, which allowed two documents to be merged.

In 1964, while the Beatles were revolutionizing music with the smash hit "I Want to Hold Your Hand," IBM revolutionized word processing with the introduction of the MT/ST (Magnetic Tape/Selectric Typewriter) (see Figure 1). The MT/ST used a tape

a
WORD

Courtesy of IBM

cartridge, similar to a tape cassette, for sequential data access. The machine was a singular improvement in word processing because in addition to storage and retrieval of repetitive text, it allowed insertions, deletions, and corrections. Five years later IBM went a step further, introducing an MT/ST that used magnetic cards. Each card equaled a page of text, making page access easier.

In the early 1970s Lexitron and 3M introduced video display word processors that let users see and change text on screen rather than on paper. Corrections and additions were instantaneous. In 1973 Vydec introduced a word processor with the floppy disk, which offered random rather than sequential data access and marked a significant step forward in data accessing speed.

Early electronic word processors were costly and large, but by the mid-1970s word processors had appropriated the microprocessor chip, which brought about reduced cost and higher performance in a compact package. The advent of the personal computer in the 1970s introduced early programs such as *ED Editor Program* (Digital Research) and *Electric Pencil* (Michael Shrayer Software). *WordStar* (MicroPro) quickly rose to prominence with its ease of use and powerful features. Thanks to these early microcomputer programs, the powers of word processing came within reach of anyone who could afford a microcomputer.

Mainframe and Dedicated Word Processing

PC word processors are often composite mainframe and dedicated word processing programs with a bit of originality thrown in. My experience with word processing began on a Burroughs mainframe computer, which incorporated many features of past and present text editors. The program was called PETT, an acronym for Pretty Easy Typing at the Terminal. *Easy* was a misnomer in this case, however.

PETT text files contained embedded codes, such as a '*C' on one line to signal centering the subsequent line of text. Paragraph indentations and other formatting codes were typed into the body of text in a similar fashion. A separate file contained cryptic codes for margins, tabs, and other formatting instructions. To see a formatted document as it would look in print, you had to run a separate printing program that merged the text file with the format file. After trying PETT, many people fought to get their typewriters back.

Although mainframe word processing programs are still in use, most word processing departments long ago switched to dedicated word processors, which were a blessing for people who didn't need to write programs or process massive amounts of data. Dedicated word processors are computers that do only one thing—word processing. They are generally easy to use, fast, and extremely good at producing many kinds of business documents (see Figure 2).

In addition to closely matching dedicated features, personal computers let you choose from a wide range of hardware configurations and application software.

The keyboards on these word processors are dedicated to editing features, and the key functions are typically printed on the keys. Unlike mainframe word processing, what you see on a dedicated word processor's screen is very close to what you get on paper.

Until recently, dedicated word processing seemed like the answer to all documentation needs. But the first machines cost about $15,000 for a system unit, a monitor, disk drives, and a printer. Only large businesses could afford dedicated machines or had room for them—most units were about the size and weight of a small refrigerator. Furthermore, they were limited to one application—word processing. Although dedicated word processors now cost and weigh less, they are still limited in processing versatility.

Figure 1: The first word processor—IBM's MT/ST. The MT/ST used a tape cartridge for sequential data access.

Figure 2: The old and the new in Wang dedicated word processors. Above is the popular WP 55, introduced in 1976, which was used strictly for word processing. On the facing page is the new Wang Office Assistant, which includes a multitasking operating system and can run other applications besides word processing.
Courtesy of Wang Laboratories

Word processing on the PC did not initially threaten the dedicated word processing market, because early PC software was not as easy to use or as powerful as dedicated systems. But in recent years word processing software on the PC has significantly challenged dedicated systems. In addition to closely matching dedicated features, personal computers let you choose from a wide range of hardware configurations and application software to maximize versatility. And lower costs have expanded word processing beyond the typing pool and placed it in the hands of corporate executives, owners of small businesses, and other individuals.

A Growing List of Features

From the simplest to the most complex, word processing programs offer something for everyone. When you are shopping for a word processor, look for features in the following categories: ease of use, screen formatting, printing, editing, file management, and writing aids. For a comprehensive list of features, see Table 1 in "Word Processing '85."

Screen features control the way the program displays menus and pages of text. A "menu-driven" program is one in which screens offer choices for document handling and frequently used editing features such as deleting or moving text. Help menus show step-by-step instructions for performing editing functions. On-screen display of the current page, line, and column number is essential. These counters keep you attuned to how the text on screen will appear on the printed page.

Pages are often displayed on screen in a scrolling format with page breaks represented by dotted lines. The end of one page and the top of the next are contiguous. With some programs, adding or deleting text on one page affects text on following pages.

Other programs show pages as separate entities so that editing text on one page doesn't affect subsequent pages.

The method of accessing pages varies dramatically with different programs. The scroll page format may require you to press <PgDn> several times to get to a distant page. With the discrete page format, you can go directly to the page you want by entering the page number.

The most important editing functions to look for in a word processing program are quick and easy moving, copying, and deleting features. To locate text, you should be able to move the cursor at least by character, word, line, and screen of text. Once you edit text, automatic reformatting of surrounding text may be desirable.

Formatting and shaping text should be simple and straightforward. Some programs provide format blocks or on-screen rulers where you can enter numbers for line spacing, margins, and tabs. Centering, underlining, and boldface should look similar to what you will see on the printed document, with no embedded codes.

You might also want some advanced features. But more features usually mean that you will need more memory in your system, that the program will cost more, and that there will be more commands to remember. Most programs have keystroke-saving features such as search and replace and copying or moving text between documents. Some programs provide macros, which reduce lengthy command and text strings to one or two keystrokes. Other programs offer libraries for storage and recall of repetitive boilerplate text and frequently used format lines or style sheets. If you generate repetitive letters or forms, you will probably want a program that has mail merge capability so you can combine a form document with a list of variables such as names and addresses.

You will probably want a word processing program that can take advantage of the special capabilities of your printer. If your printer supports proportional spacing, subscripts and superscripts, italics,

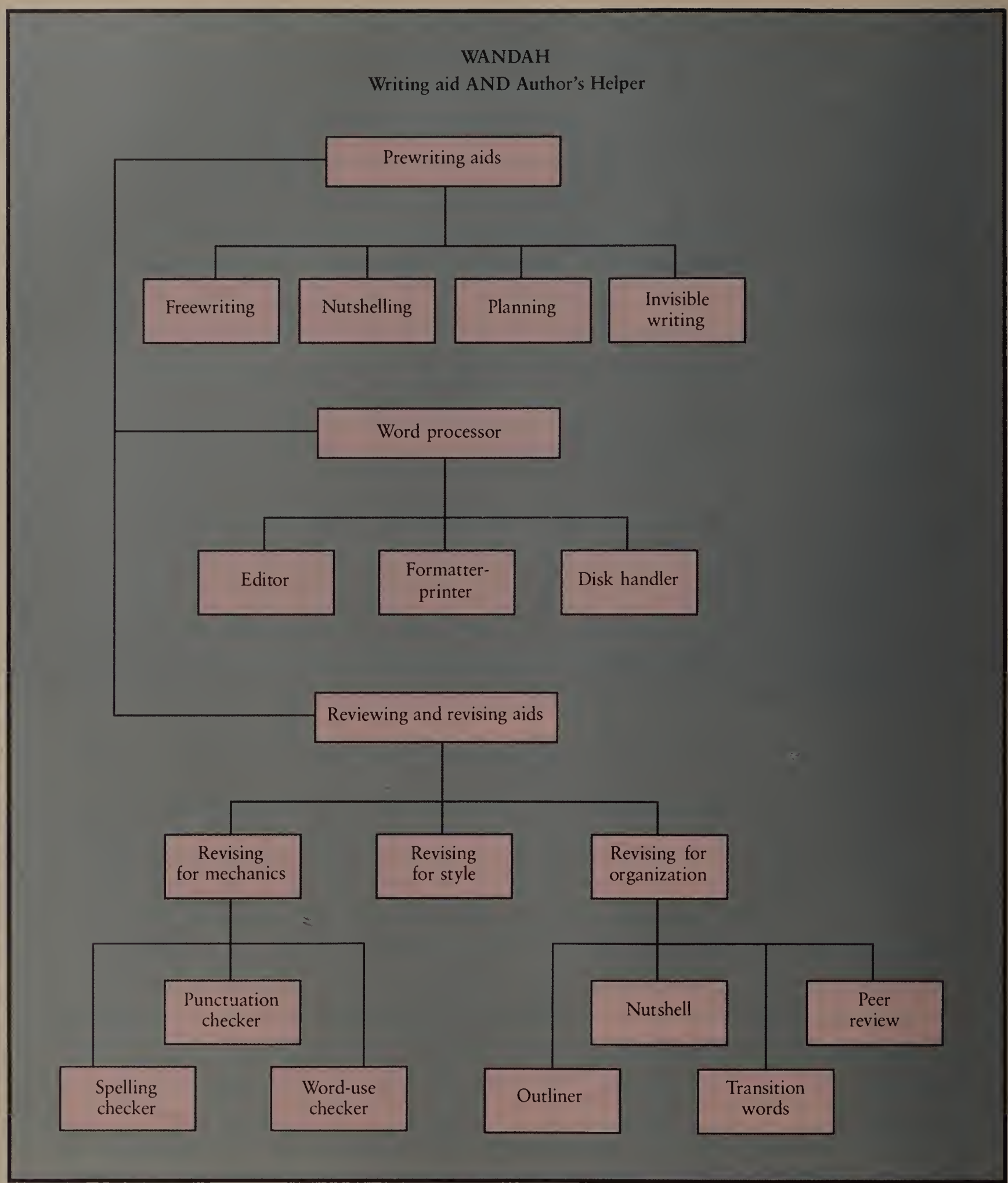

Figure 3: The conceptual design of WANDAH, a new word processing program developed at UCLA, which incorporates writing aids that assist the user in composing and writing text

and scientific and foreign language characters, you may want a word processor that does too. Other special printing features provide print queuing (lining up several documents to print), print spooling (a print buffer that permits you to edit while the printer prints), printing of selected pages, and interrupting the printer for input from the keyboard.

People who work with statistical documents have specific word processing needs. Statistical features include decimal tabs (which automatically align columns of numbers to the left and right of the decimal point), column moves (for moving selected columns of numbers), column centering (for centering titles over one or more columns), horizontal scrolling (for viewing and editing wide tables), and on-line math capability (for doing simple calculations without having to exit the program).

During the last few years, a major trend in word processing programs for the PC has been the emulation of dedicated word processors.

If you create complex reports or academic papers, you should look for a program that supports alternating headers and footers (the header or footer appears on the left on one page and on the right on the facing page). Other report features include automatic footnote formatting, dual-column text formatting, and automatic indexing and table of contents generation.

Word processing companies strive to have their programs stand out in the crowd by loading them with features. Many features may be useless to some people but indispensable to others. These extras include flush-right tabs (typed characters appear to the left of the cursor), soft hyphenation (automatic hyphens that appear or disappear during editing according to the position of words in a paragraph), hard indent word wrap (all lines in a paragraph are indented from a tab), and character transposition (switching the order of characters). Other features include changing the case of highlighted characters, renumbering and indenting lists, and widow and orphan control (fixing page breaks to prevent single lines from being separated from their paragraphs). Many new word processing programs cater to human indecisiveness by offering an undo command for recalling deleted text or reversing the last action.

The Latest Trends

During the last few years, a major trend in word processing programs for the PC has been the emulation of dedicated word processors. Since many large companies that bring the PC into the corporate environment have experience with dedicated word processors, there is a ready-made market for dedicated look-alikes that run on the PC.

IBM recently introduced *DisplayWrite 2* for those who want to give up their DisplayWriter dedicated word processors and switch to the PC (see "DisplayWrite 2: In the Corporate Mold" in this issue). NBI, manufacturer of the NBI dedicated word processor, recently cut its losses by offering *NBI* word processing for the PC.

Wang, which has the largest installed base of dedicated word processors in the world, is the progenitor of many PC programs from companies quick to recognize Wang's prominence in the marketplace. Multimate International was the first company to introduce a Wang look-alike for the PC about two years ago with *Multimate*. Recently introduced Wang-like products include *Leading Edge Word Processor* (Leading Edge Products), *Symphony* (Lotus Development), and *OfficeWriter* (Office Solutions).

To encourage the corporate conversion of dedicated word processing files to PC word processing files, manufacturers are producing software and hardware that can transfer files between the dedicated systems and PC programs. These file transfer products keep control codes intact to minimize cleanup of files on the PC (see "Media Conversion," *PCW*, Vol. 2, No. 9).

Applications integration is another major trend in software, and the word processed document tends to be the most common output medium for the various applications. Word processing is normally included in integrated packages along with spreadsheet, data management, and graphics functions. Integration aims to provide more software at one low price, fewer keystrokes to move data between programs,

and similar functional keystrokes to process data in all applications. With integrated packages, windows and mice will continue to open new vistas for word processing.

A more direct type of integration is the increased use of supplementary writing aid programs such as spelling and grammar checkers and thesauruses. Some programs come with these aids built-in or installable for extra cost. Adjunct programs that work with most word processing programs are also available from third-party vendors.

Some writing aid programs straddle the line between educational and word processing software. *WANDAH,* a program developed at UCLA, is a word processor that also provides various modes of writing, including outlining, summarizing, and invisible writing. With this last feature, the screen does not display what you type. This helps eliminate writer's block and control the tendency to compulsively edit. Editing aids include the traditional spelling checker as well as analysis of punctuation, word usage, and paragraph transitions (see Figure 3).

Graphics are increasingly being incorporated into text documents to illustrate ideas. Some programs enable you to import graphics files and place them directly in the text. If you have an appropriate graphics printer, you can print graphics and text in a single pass. Laser printers in particular make this process easier.

You can also buy a list or data manager with a direct interface to your word processing form-letter files to give you greater flexibility in sorting and selecting data. Other writing aids include sample business letter programs that contain files you can copy and modify with your word processor.

Outline processors can help you organize and rearrange the contents of a document. After producing an outline, you can flesh out and edit the document with your word processor.

Perhaps the most significant trend in integrated word processing is the emergence of the text data management system (TDMS), which combines word processing and data management text retrieval. TDMS software helps keep you organized by storing blocks of text with keywords so you can reference and cross-reference text files. A TDMS enables you to pull together files into a word processing document through keyword and Boolean (AND, OR, NOT) searches (see "THOR: New Thunder" and "Due Processing" in this issue).

Artificial Intelligence

Electronic word processing has undergone monumental improvements during the past 20 years. As artificial intelligence (AI) comes of age in the coming decades, we're likely to see word processing influence the way we think, write, and express ourselves. Some dreamers see a Hal-like (*2001*) word processor that provides commentary, advice, and criticism for our written endeavors. Such a "mentor" system would act as a sounding board for ideas and analyze our work. Today limited AI programs, called expert systems, are being developed to provide knowledgeable advice in such diverse fields as locomotive repair and medical diagnosis. An expert system for writing may not be far away.

Since human generation of language still baffles linguists, it isn't surprising that AI investigators are finding computerized generation of language a tough nut to crack. While many imagine that voice recognition will soon free us from the antiquarian keyboards

we seem harnessed to, voice recognition depends on significant advances in AI and improvements in the fabrication of increasingly sophisticated chips, all of which require expensive research for results that seem intangible at best. It is unlikely that we'll see voice recognition technology used for large-vocabulary data entry in the near future.

We are more likely to see increasing integration of word processing and electronic mail, which links us to the widening audience of the electronic global village. Public data bases are becoming centers for group novels and reports written by hundreds of people. Vast electronic libraries are opening up the world's literary treasures for extraction and editing by remote word processors. For example, you could search by keyword for quotes that might support a report you're writing or assemble a boilerplate document of your favorite quotes throughout history. Already there are programs that can help a clergyman extract a sermon by electronically scanning the Bible and pulling out appropriate passages.

The widespread use of word processing and telecommunicating may lead to interesting legal and aesthetic problems. In an environment in which rewriting and editing are so facilitated by technology, the mark of an individual writer may well be diluted. Original creative efforts may largely be abandoned in favor of a new literature of compilation and collage. The nature of our language and the changeable way we express ourselves mean that rewriting is and will forever be part of writing. Advances in electronic word processing will continue to make rewriting as spontaneous and effortless as possible—and raise questions we may not be able to answer so easily. ●

Janette Martin is a Contributing Editor for PC World. *She specializes in PC software training.*

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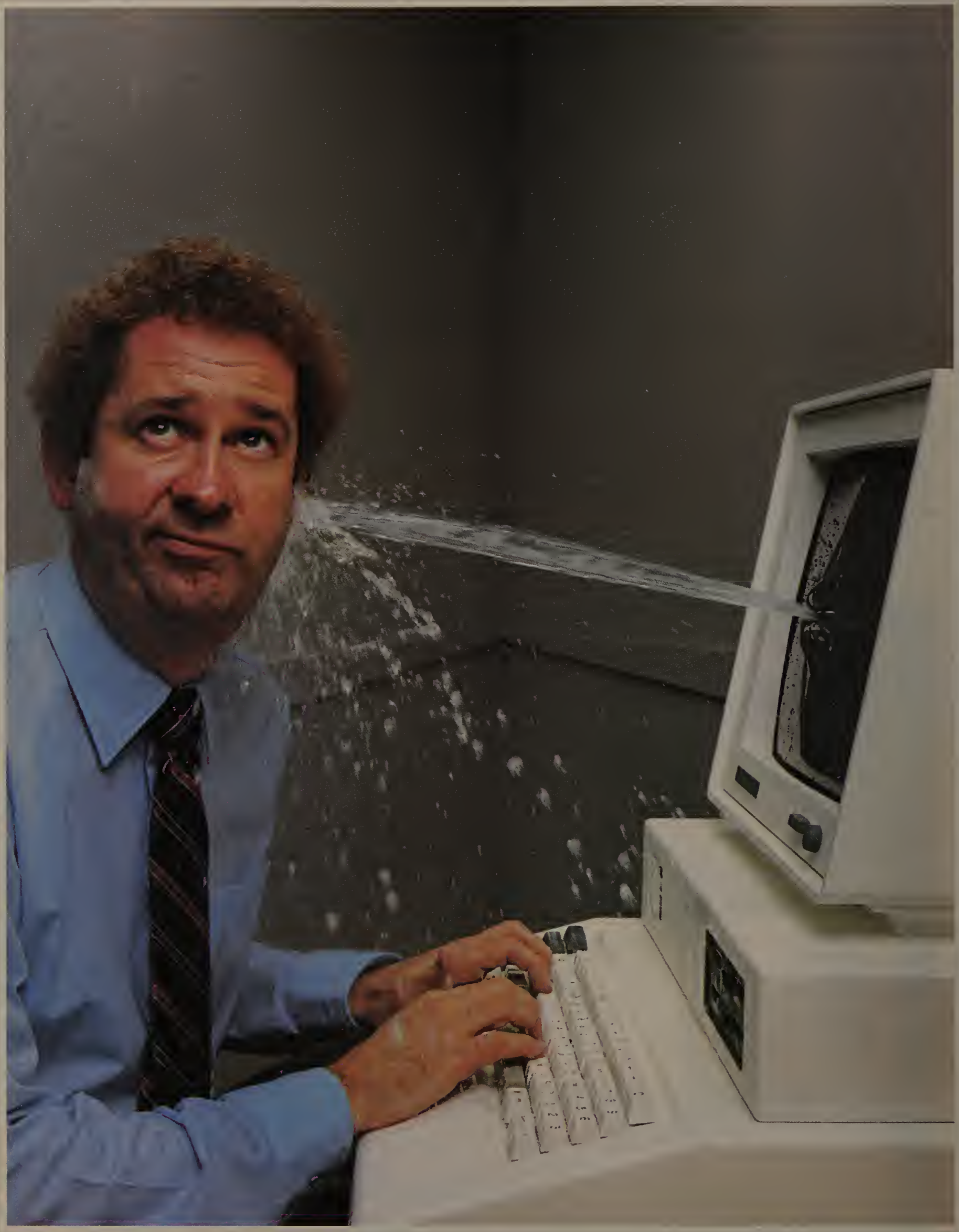

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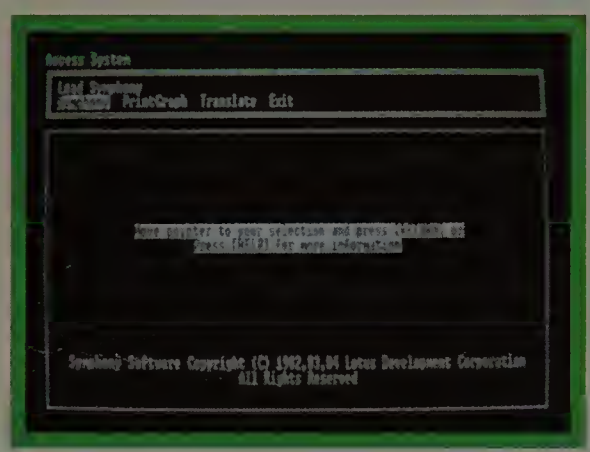

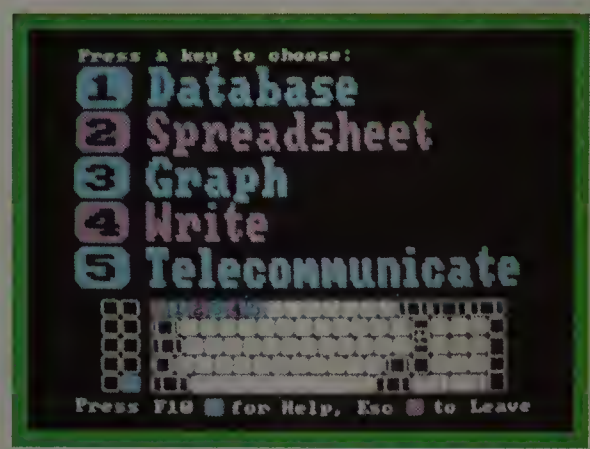

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Keystroke "flip" back to previous screen	Yes	No	No
"Free Form" spreadsheet	Yes	No	No
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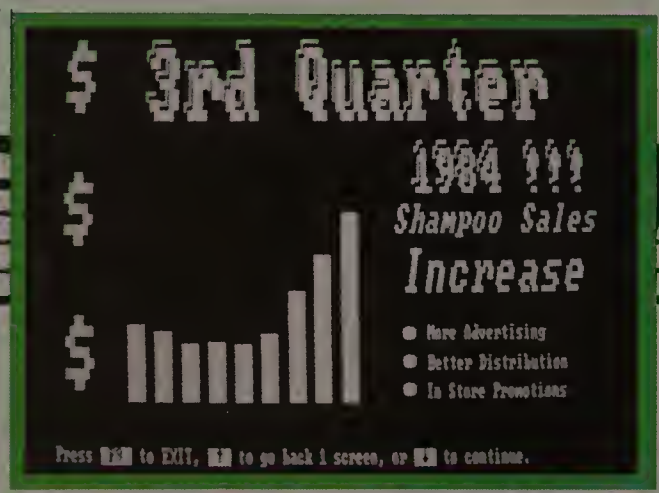

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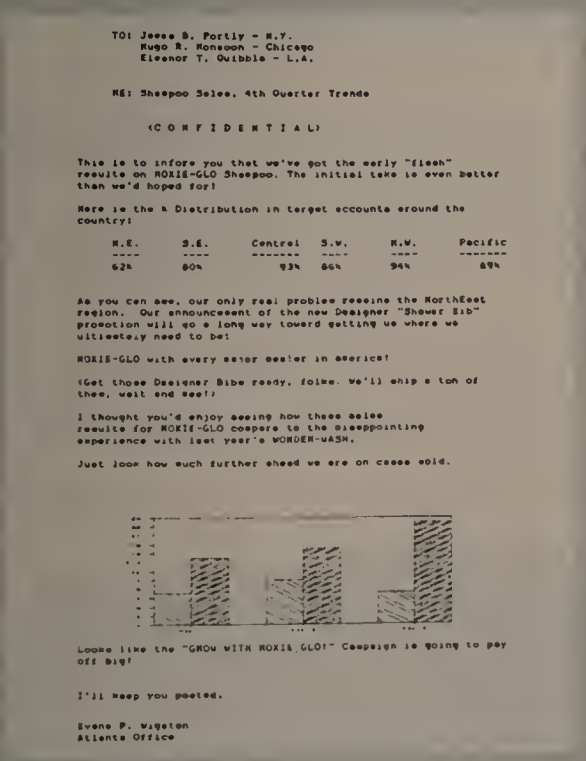

TO: Jesse B. Portly - N.Y.
Hugo R. Monsoon - Chicago
Eleanor T. Quibble - L.A.

RE: Shampoo Sales, 4th Quarter Trends

(C O N F I D E N T I A L)

This is to inform you that we've got the early "flash" results on MOXIE-GLO Shampoo. The initial take is even better than we'd hoped for!

Here is the % Distribution in target accounts around the country:

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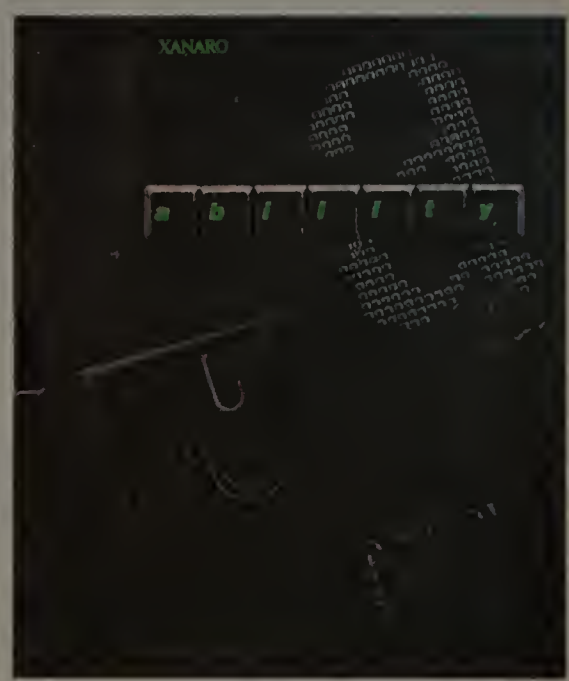

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The Help Screen

PC World offers answers and advice at every level

Single-sided disks formatted for double-sided use, floppy disk terminology, making a BASIC program disk self-starting, and WordStar control keys' positions for the Dvorak keyboard

Karl Koessel

This month we review the many terms used to describe floppy disks, make a disk that automatically starts up a BASIC program, and learn how to redefine the IBM PC's keyboard so that a Dvorak keyboard will produce the proper *WordStar* control key commands using the familiar keystrokes of the QWERTY keyboard arrangement.

Floppy Facts

Q. I recently bought some single-sided, double-density disks for my PC XT. By mistake I formatted one of them as a double-sided disk, and to my surprise the DOS command CHKDSK confirmed that the disk had 360K free bytes. I tested the disk, and it seemed to function properly as a double-sided disk. Is it okay to use single-sided, double-density disks in the double-sided format, and could you explain the terminology used to describe floppy disks?

Michael Abajian
Burlington, Vermont

A. Yes, you can use single-sided disks formatted to be double-sided; however, such disks are likely to develop problems sooner than disks certified for double-sided use. The problem is that floppy disks—all of them—eventually wear out. To understand how a disk wears, you must examine how it is made and used.

First, a mylar disk is dipped into a solution of magnetically sensitive material, which coats the mylar. When the coating is dry, the disk is inserted into a square *jacket* whose inner surfaces are lined to reduce friction (see Figure 1). The disk is then tested to ensure that every part of it will hold a magnetic charge. Single-sided disks, however, are tested on one side only. The disk is then placed inside a paper *envelope*, ready to be sold.

The term *density* refers to the number of bytes a disk can store on a single *track*. A track is a thin, circular portion of the disk on which data has been written. The PC's double-density floppy drives write 40 tracks per side. Double-density disks use a higher grade of recording material, which can store more bytes per track than single-density media. The PC does not use single-density disks.

When you close the door of a floppy disk drive, the disk is centered by a spring-backed *cone*, which also *clamps* the disk against a belt-driven flywheel. At the same time, a magnetic *read/write head* (double-sided drives have two read/write heads, one on each side of the disk) similar to that used in a tape recorder is pressed against the disk inside the disk *window*, or *head slot* (the oblong cutout in the jacket where the disk is exposed—the same place we have all learned not to touch so that dirt and oil from our fingers will not contaminate the read/write head). The read/write head can be moved to 40 distinct positions (thus creating 40 tracks) inside the head slot. As the disk spins under the read/write head, it wears, until finally some portion of the recording material is so thin that it cannot hold a magnetic charge. The disk is then no longer usable, and you must use a backup copy.

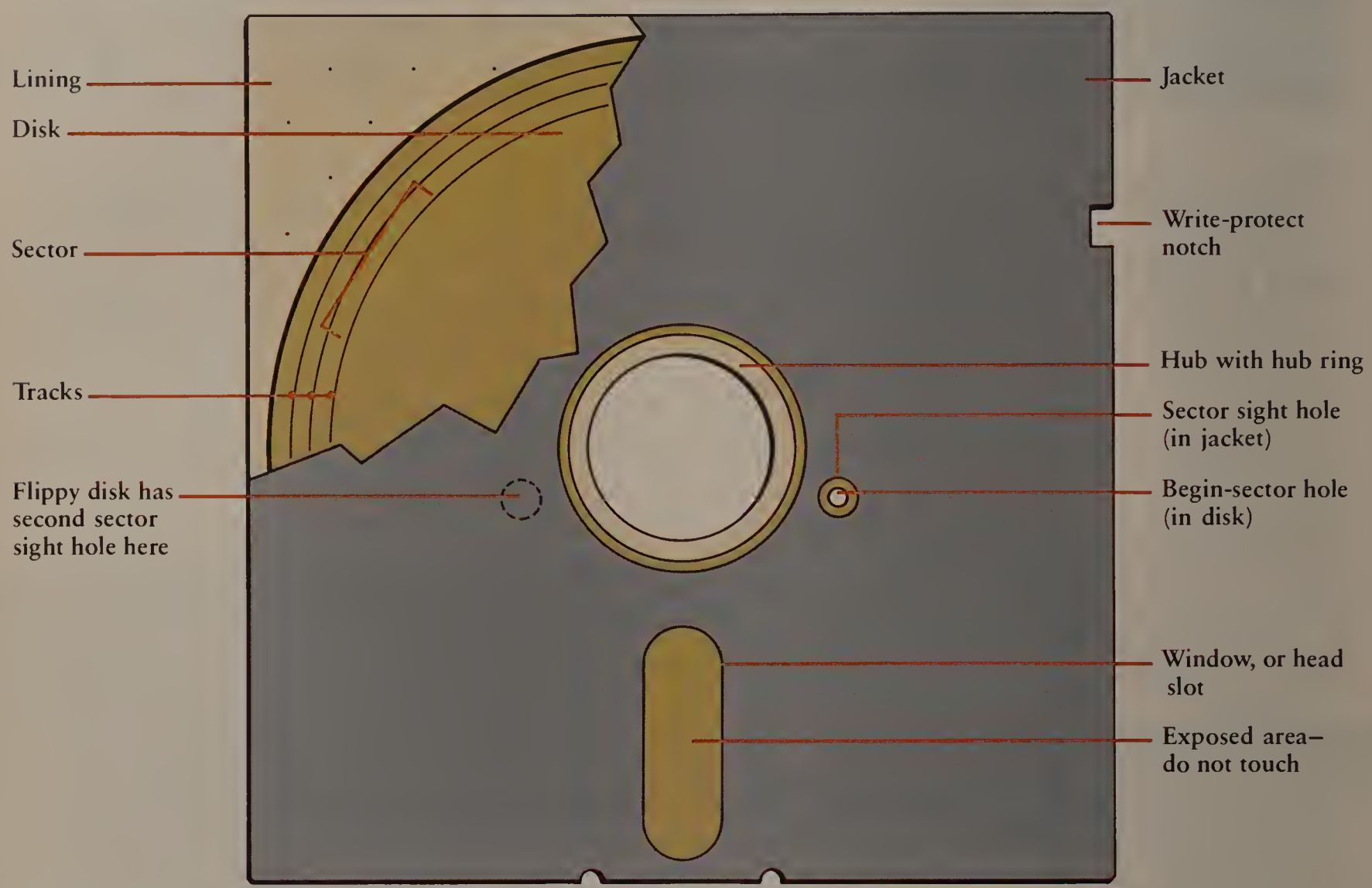

Figure 1: A cross section of a floppy disk

In addition to the previous terms, you may also encounter the following:

Write-protect notch. The rectangular notch in the side of the disk jacket, which can be covered by a piece of tape to prevent the drive from writing data on the disk.

Hub. The edge of disk surrounding the large hole in the center of the disk. Because the cone clamps the hub to the belt-driven flywheel, the hub suffers the most stress when the disk is used. Many disks come with *hub rings*, which reinforce the hub.

Sector. A portion of a track. DOS divides each track into eight or nine equal sectors that hold 512 bytes each.

Sector sight hole. The small hole in the jacket near the hub. A light-sensitive sensor is triggered when the *begin-sector hole* (see next term) of the disk passes the sector sight hole of the jacket.

Soft-sectored and *hard-sectored.* Terms that describe how sectors are determined. A soft-sectored disk has one begin-sector hole in the disk itself; the hole marks the start of the first sector. DOS divides the rest of the track into sectors by measuring how far the disk has turned since the begin-sector hole passed the sector sight hole. DOS 1.10 and earlier versions divide each track into eight sectors; DOS 2.00 and later versions can divide each track into eight or nine sectors. Hard-sectored disks have a begin-sector hole at the start of each sector and thus cannot be used by the PC.

Cluster. The number of sectors that DOS reads or writes at a time. Disks formatted as single-sided have one sector per cluster; double-sided disks have two.

High-capacity floppy disk. The new disk for the IBM PC AT's high-capacity disk drives. DOS 3.00 formats this double-sided disk with 15 sectors per track and 80 tracks per side, yielding 1.2 megabytes (MB) of data storage space per disk.

Flippy disk. A disk whose jacket has two sector sight holes and that has been formatted as a single-sided disk on both sides. Thus, when you flip the disk "upside down," a single-sided drive reads information from the other side of the disk. Although a flippy allows users of single-sided drives to store twice as much data on each disk, this practice is not advised. When the disk is flipped, the disk spins backward within the jacket. This sometimes loosens dirt caught in the jacket lining, soiling the read/write head.

Automatic BASIC

Q. I found "DOS for Beginners" [PCW, Vol. 2, No. 4] to be an excellent article. The article, however, did not touch upon BASIC. Would you please let me know what must be done so that a BASIC program will run automatically when the PC is booted? This is often described as a turnkey system. Also, can anything be done to prohibit the BASIC program from being listed or copied?

Donald Holland
Berkeley, California

A. In order for a disk to boot the PC and automatically start a BASIC program, it must contain the operating system (DOS), the BASIC language interpreter (BASIC.COM or the advanced version, BASICA.COM, which supports additional commands and statements such as PLAY and DRAW), the BASIC program itself, and an automatic startup file called AUTOEXEC.BAT. Whenever the PC is started up or reset

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by <Ctrl>-<Alt>-<Del>, DOS is loaded from the disk, and the disk directory is searched for a batch file called AUTOEXEC.BAT. If that file is found, DOS will skip its usual request for the date and time and execute the contents of that file as if they were commands typed from the keyboard.

To create such a disk, use the command **FORMAT A:/S** to format a new disk in drive A:. The /S parameter tells DOS to copy the three system files onto the new disk. Two of these files, IBMBIO.COM and IBMDOS.COM, are hidden files and do not appear when you list the directory with the command DIR. The third file is called COMMAND.COM and is also known as the DOS command processor. Copy BASIC.COM (or BASICA.COM if the BASIC program requires Advanced BASIC) from the original DOS disk onto the new disk. Next, copy the BASIC program onto this disk.

The last step is creating the AUTOEXEC.BAT file. Type **COPY CON: AUTOEXEC.BAT** and press <Enter>. Type **DATE** and press <Enter>. Type **TIME** and press <Enter>. Type **BASIC** (or **BASICA** if you are using Advanced BASIC), a space, and the file name of the BASIC program (without the .BAS file name extension), and press <Enter>. Finally, press function key <F6> (you will see '^Z' appear) and press <Enter>. The drive will spin, and then you should see the message '1 file(s) copied' displayed. Now whenever the PC is started up or reset with this disk in drive A:, you will be asked for the date and the time, and then the BASIC program will begin.

To prevent a BASIC program from being listed or edited, bring up BASIC, LOAD the program, and then SAVE it with the command **SAVE** *"filename"*,**P**. The ,P (for protected) parameter does not, however, prevent the program from being copied, and there are ways to unprotect the program file. To prevent any file from being copied in a usable form, you must either encrypt it so that a copy is unusable or employ sophisticated copy-protection schemes not available with DOS. Such copy protection is available from mass disk-duplicating companies. Encryption schemes employing software, hardware, or both are discussed in "Encrypting Sensitive Data," *The Help Screen, PCW*, Vol. 2, No. 11.

IBM now sells *Data Encoder*, a program that encrypts (and deciphers) data and program files. *Data Encoder* uses a security technique developed by IBM (the Data Encryption Algorithm), which has been adopted as a national standard (ANSI X3.92-1981) and as a United States government standard (FIP546-Data Encryption). This program and its documentation are released in the United States only and must be licensed by the U.S. Department of State prior to export.

Dvorak WordStar

Q. I recently bought a Dvorak keyboard from Key Tronic for my PC, hoping to improve–maybe even double–my dismal 35-words-per-minute typing speed on a standard QWERTY layout. After a bit of practice and breaking some old habits, I did boost my typing speed. But there's still one problem: I use WordStar, *and making most common keystroke combinations–among them <Ctrl>-F, <Ctrl>-T, and <Ctrl>-Q–is now more difficult. The speed improvements gained from the Dvorak layout are largely displaced by the control key combinations I use for* WordStar. *Is there any way I can bring these often-used keystrokes back to their original keyboard positions?*

Alan Wamsley
Qualicum Beach, British Columbia, Canada

A. The keys of the PC keyboard can be reassigned by a number of key redefining utilities, such as *ProKey* and *SmartKey*. These packages are very easy to learn and use. Information about them can be found at the end of this column.

The PC's keys can also be reassigned with the ANSI.SYS (extended screen and keyboard control) device driver under DOS 2.00 or later versions. Once the ANSI.SYS driver is installed, you

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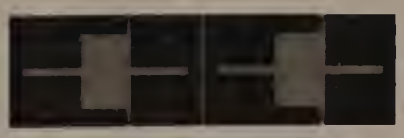

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can use a batch file (see "Changing Keys," *PCW*, Vol. 2, No. 3) or an assembly language program (see "ANSI.SYS Key Reassignment," *.*, *PCW*, Vol. 2, No. 6, and "Key Reassignments With DEBUG," *.*, *PCW*, Vol. 2, No. 13) of keyboard reassignment commands to reassign the control key combination you need for *WordStar*.

The ANSI.SYS driver can reassign a key to produce a single character or a string of characters. The article and the *.* items mentioned have more information on the use of the ANSI driver, but an example here will demonstrate how easily keys are reassigned.

To install the ANSI.SYS driver, copy the ANSI.SYS file (it's on the DOS disk) to the disk you use to start the PC (your "boot" disk). Next, place that disk in drive A:, type **A:**, press <Enter>, and check the disk for the existence of a CONFIG.SYS file with the command **TYPE CONFIG.SYS**. If the message 'File not found' appears, you must create a CONFIG.SYS file that contains the line 'DEVICE=ANSI.SYS'. (If the file is found, its contents will be displayed on the screen. If the file contains the line 'DEVICE=ANSI.SYS', you can skip the next two paragraphs. If the file exists, but the line is not present, you need to add the line to the file; skip the next paragraph.)

To create a new CONFIG.SYS file, type **COPY CON: CONFIG.SYS** and press <Enter>. Then type **DEVICE=ANSI.SYS**, press <F6> (which displays a '^Z'), and press <Enter>. You should receive the message '1 file(s) copied'.

To add the line to an existing CONFIG.SYS file, type **COPY CONFIG.SYS + CON** and press <Enter>. Then press <Enter> (to ensure that what is typed next is on its own line), type **DEVICE=ANSI.SYS**, press <F6> (which displays a '^Z'), and press <Enter>. You should receive the message '1 file(s) copied'.

Now reboot the computer, and the ANSI.SYS driver is installed. As an example, here's the procedure to reassign <Ctrl>-Y to be <Ctrl>-T. Type **PROMPT $e[**" and then hold down the <Ctrl> key and tap **Y**. Now type ";" and hold down the <Ctrl> key while you tap **T**. Finish by typing **;p**, and the command should read (ignore the single quotes):
'PROMPT $e["^Y";"^T";p'

Press <Enter>. Try the new key definition; pressing <**Ctrl**>-**Y** should produce '^T' on the display. The keystroke between the first set of double quotation marks has been reassigned to produce the keystroke between the second set of double quotation marks. One last note: Although you have pressed <Ctrl>-Y, the *WordStar* status line will display '^T', the QWERTY equivalent of the Y key's Dvorak position.

Do you have any questions concerning the IBM PC or compatibles? Send them to The Help Screen, PC World, *555 De Haro St., San Francisco, CA 94107, or electronically to CompuServe 74055,412 or The Source STE908.*

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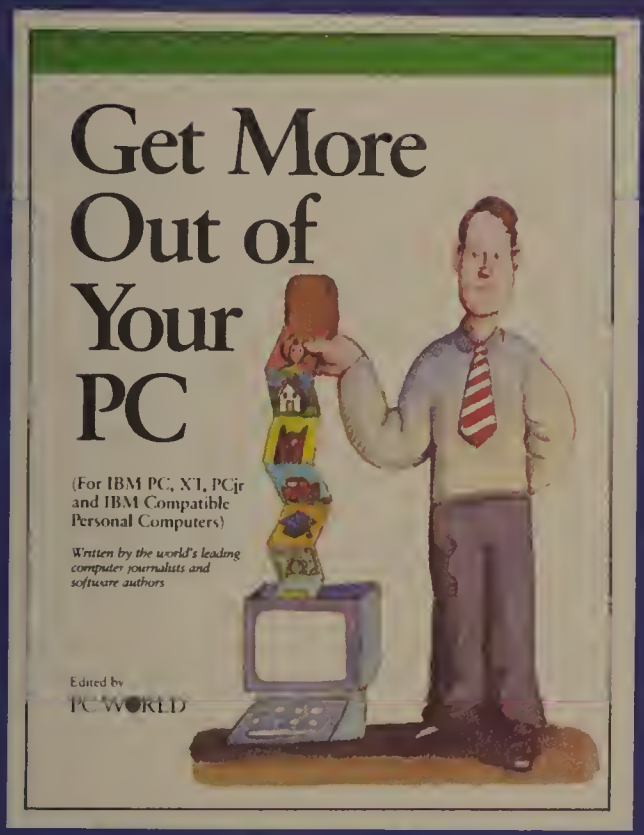

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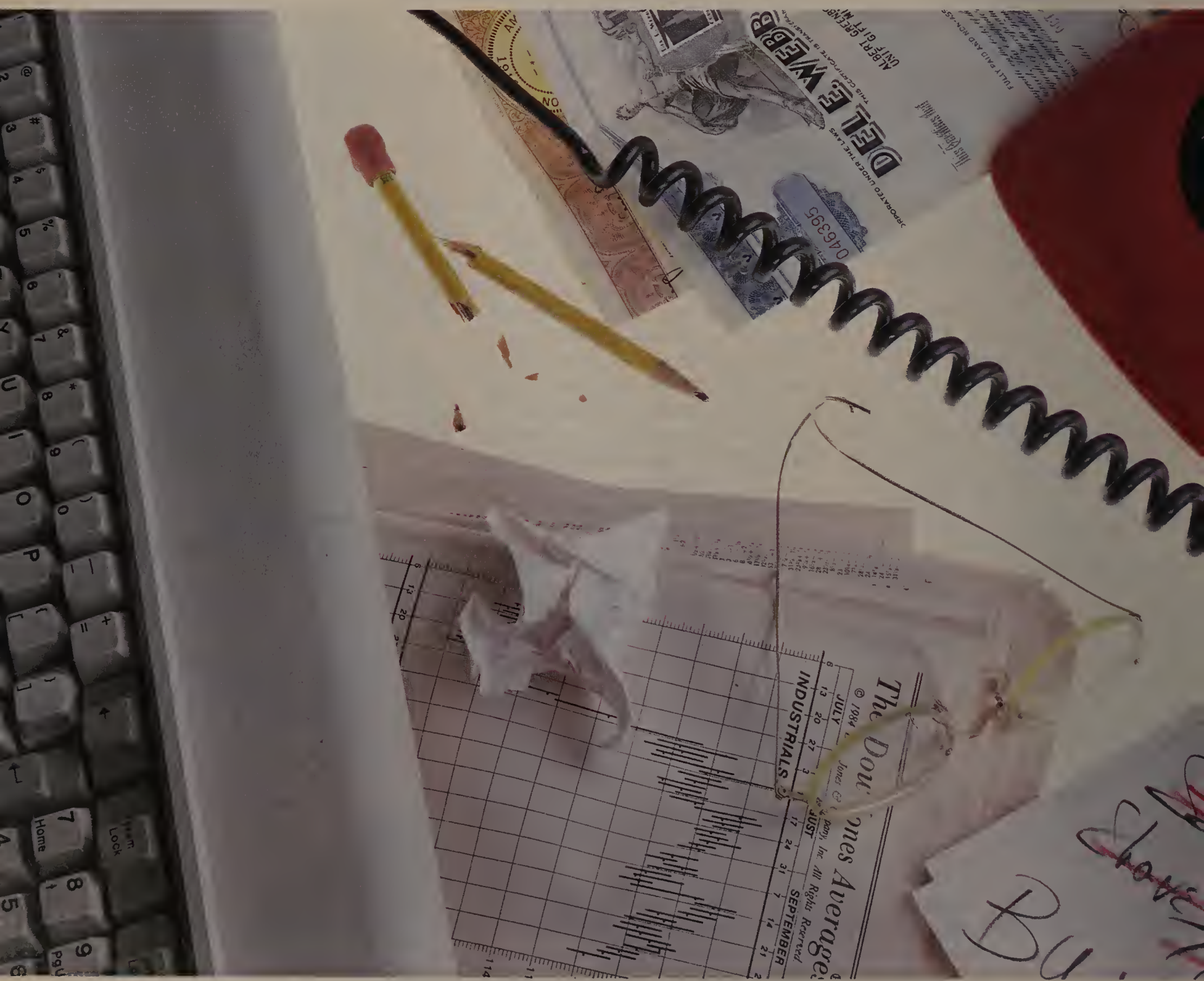


For some time a host of communications packages has enabled investors to access investment information via the PC. Another breed of software has brought investment analysis to the desk top, helping extensively with the market tracking and calculating that are needed for informed investment decisions. But now a new family of services currently in its infancy enables you to place orders from your home or office at any hour of the day or night.

Michael Shapiro

A small but growing number of brokerage firms are offering on-line trading services that allow investors to enter buy and sell orders from their dens or offices. The key word here is *enter.* The brokerage firm still does the actual trading, but the investor is now closer than ever to the Big Board or to the stock exchange or market of choice.

These on-line services–most of which are offered by discount brokerage houses–vary in features and sophistication but share certain traits. All are

Table 1: On-line trading services

Account/Firm/Telephone Number	Initial Fee	Minimum Investment	Monthly Fee	Connect Charges to Trade
Desktop Broker C. D. Anderson 300 Montgomery St. #440 San Francisco, CA 94104 800/822-2222	$50	None	$15, includes 1 hr. free connect time	Yes
Investor's Express Fidelity Investments 82 Devonshire St. Boston, MA 02109 800/225-6197	$49.95	None	$15, includes 1 hr. free connect time	Yes
Micro Computer Account Unified Management Corp. 600 Guaranty Bldg. Indianapolis, IN 46204 800/862-7283	No fee	$1000	None	No
NAICO-NET North American Investment Corp. 800 Connecticut Blvd. East Hartford, CT 06108 800/243-4322	$19.95	None	$3.50 **	Yes
The Source Investor Service Spear Securities 626 Wilshire Blvd. #708 Los Angeles, CA 90017 800/336-3366, 800/321-6116 California	$49.95 *	None	$10	Yes
Tickerscreen Max Ule & Co., Inc. 6 E. 43rd St. New York, NY 10017 800/223-6642	No fee	None	None	No

* This is the fee to subscribe to The Source. Source subscribers are not charged an extra fee to an on-line account with Spear Securities.

** Waived if peak charges are paid with a major credit card.

menu-driven, relatively easy to learn and use, accessible by modem (in every case, a local phone call), and provide the investor unprecedented convenience. The services are of special value to busy professionals or other investors who can't easily talk to their brokers during market hours. This kind of convenience is the major selling point of what, for lack of a better term, is becoming known as on-line trading.

A subscriber to an on-line trading service can enter orders at any hour of the day or night. In virtually every case, orders are transmitted to the brokerage firm and executed when the market opens. Once an order is entered, there is no need to confirm by telephone.

Technically, none of the on-line trading services is on line to the market itself; instead, each functions as a message service. Every order that an investor enters at home is checked by brokerage personnel before being sent to the exchange floor or the trading desk.

Still, on-line trading represents a big departure from the conventional means of trading securities—making a telephone call—although it's unlikely that most investors will immediately abandon their phones for PCs and modems. But because time is money, this

Connect Charges	Minimum Brokerage Commission
$24/hr. peak $ 6/hr. off peak	$30
$24/hr. peak $ 6/hr. off peak	$30
$15/hr. peak $ 5/hr. off peak	$35
$16.80/hr. peak $ 6/hr. off peak	$35
$20.75/hr. peak $ 7.75/hr. off peak	$60
None	$25

new method of investing looms as a powerful and handy option for the independent investor equipped with a PC.

Independence is almost essential if you want to trade on line. Selecting a discount broker means paying rock-bottom commission rates in exchange for the execution of a buy or sell order, but you're on your own when choosing what to buy or sell. Discount brokers provide no research or advisory services. If you already do business with a discount broker, the transition to on-line investing will be fairly simple. If you've been using a full-service broker to help choose stocks, the decision to go on-line may be tougher.

On-Line and Growing

During the past year a handful of firms unveiled on-line trading services for the individual investor: C. D. Anderson; Fidelity Investments; Texas Securities; North American Investment Corporation; Unified Management Corporation; The Source Investment Service; and Max Ule & Company (in association with CompuServe), a division of the New York securities firm of Rosenkrantz, Ehrenkrantz, Lyon & Ross (see Table 1). At press time, New York's Chemical Bank was scheduled to begin offering on-line brokerage services to the 11,000 families on its automated home banking service, Pronto. (Chemical also licenses Pronto to other banks around the nation. On-line trading will soon appear as an option on the Pronto menu.)

Also slated to hit the market soon are on-line trading services from California's Security Pacific Bank (through Security Pacific Brokers) and Charles Schwab & Company, the nation's largest discount broker and a Bank of America subsidiary. It's a good bet that other large discount brokers and major banks with discount brokerage subsidiaries will eventually enter the game—assuming the service takes off as the first group of players hopes.

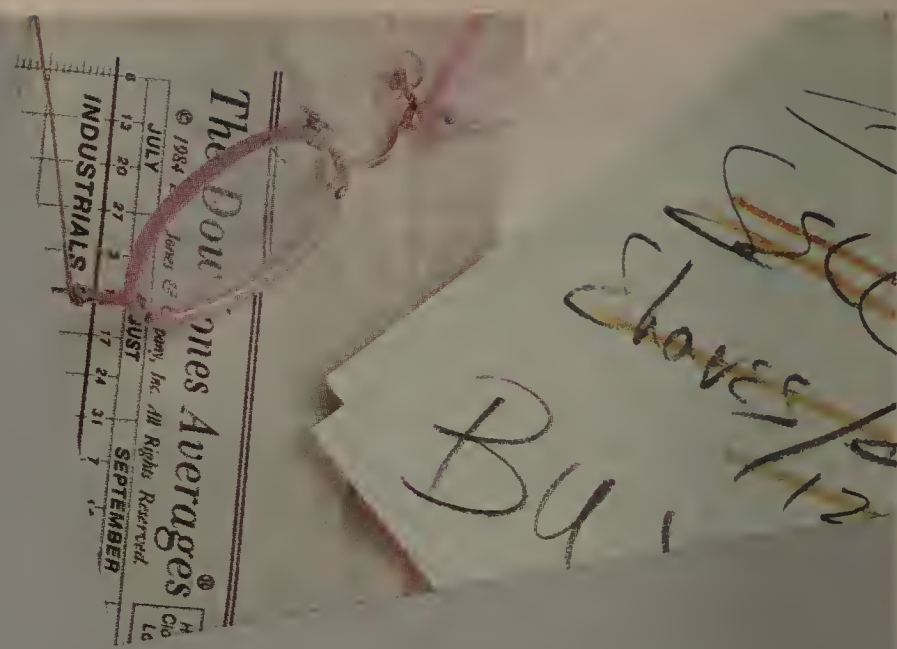
The Options Market

Although on-line trading is in its infancy, investors who want to trade by personal computer can choose from a range of services, features, and prices. Analysis, real-time stock quotations, and research are but a dial-up away (see "Your Modem to the Market").

The least expensive service (it happens to be free) is also the simplest. Offered by New York-based discount broker Max Ule & Company, the system is called Tickerscreen. It enables Ule customers who have personal computers and modems to place orders after the market has closed. The system supplies closing New York Stock Exchange quotes on request, includes a calendar of new issues, and summarizes the latest activity on ten major market indexes.

Max Ule takes a pragmatic approach to his "no-frills" on-line service. "Our system is not sophisticated, but it's free," he says. "We could offer real-

Your Modem to the Market



Depending upon your circumstances, on-line trading may be a staple or a frill. The following steps should help you clarify your aims, the nature of the on-line services, and their limitations.

1. First, evaluate your needs. Why do you want to trade on line? Do you want to enter orders after market hours? Do you need up-to-date market information to make a trade? What features (portfolio updates, proprietary research, a spreadsheet interface) are essential to your trading objectives? Features tend to be expensive, so choose only what you truly need.

2. Obtain additional information on brokerage firms that offer on-line services. As more discounters enter the on-line trading marketplace, monitor your newspaper's financial pages. Because on-line trading is a new service in a volatile industry, you can expect to find differences among proprietors of the service–and the fees they charge.

3. Always negotiate. On Wall Street, money really talks. Brokers want to do business with customers who will generate commissions. If you are an active trader or intend to invest substantial sums, mention your intentions up front. It's possible that a firm with an initial fee will waive it or allow you to pay it in commission dollars rather than in cash.

4. Open an account. Before you can trade on line, you must fill out a new-account form and select a cash or a margin account. Once you open your account, you will receive a password and instructions for using the on-line service.

5. Begin trading. Remember that all on-line services are being improved and enhanced, so keep track of shortcomings as well as features that you'd like to see, and then convey that information to your brokerage firm. A conscientious firm has a vested interest in improving its system and should welcome your comments.

6. Be cautious. If you're new to on-line services in general, be aware that they can be addictive. Making calls during market hours often results in hefty bills for connect charges. Think carefully about your needs. Usually you can economize by planning your routine before you go on line.

time quotes, portfolio updates, and all the other bells and whistles, but the firms offering these services don't appear to be making money with them."

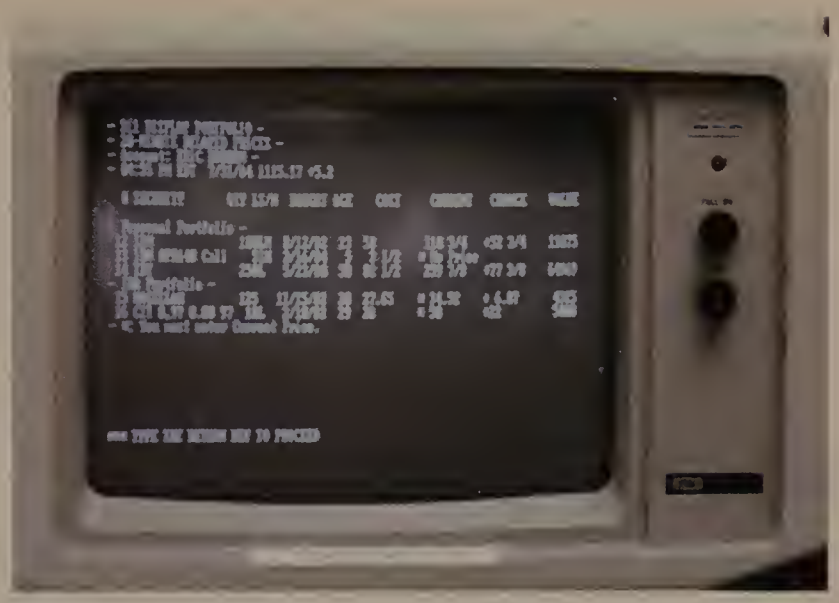
To increase access to his system, Ule recently linked up with CompuServe, an on-line information service network. The arrangement makes most Tickerscreen features free to all CompuServe Executive Information Service (EIS) subscribers and to all Ule customers who have CompuServe EIS accounts. (Ordinary CompuServe connect charges still apply, of course.) There is one caveat, however: direct order entry is restricted to EIS subscribers who are also Max Ule clients. All other Tickerscreen features are open to any EIS customer. Technically, Tickerscreen isn't absolutely free; if you're not a Ule customer, stock quotes will cost you 2 cents each.

If Ule represents the modest branch of the on-line trading business, Boston-based Fidelty Investments is the acknowledged giant of this emerging industry. Fidelity, a discount broker and mutual fund manager with 28 offices nationwide and $25 billion in assets, is marketing a service called Investor's Express. For its service, Fidelity relies on a host computer provided by Trade-Plus of Palo Alto, California. (C. D. Anderson's Desktop Broker and Texas Securities also use the Trade-Plus host, and Chemical intends to put its on-line trading service on the system as well.)

Fidelity is aggressively promoting Investor's Express through a combination of advertising and pricing. Late last summer the firm trimmed the registration fee from $195 to $49.95 and added features at no charge.

"We see using personal computers for investing as analogous to using ATMs [automatic teller machines] for banking," says Eric Kobren, Fidelity's director of marketing. "When ATMs were first introduced, experts were skeptical. Now it's clear that consumers are actively choosing the convenience and efficiency of electronic banking. We believe that the same trend is going to develop in discount brokerage."

In part because they both rely on Trade-Plus, the Fidelity and C. D. Anderson services are similar. Both offer investors an array of features, including automatic on-line portfolio updates, the ability to enter holdings purchased from other brokers into an on-line portfolio, access to stock and options quotations, and a "stock-watch" feature, which monitors up to 18 selected stocks according to predesignated buy or sell signals (see Figure 1).



Fidelity's Investor Express offers an on-line personal portfolio option that features an up-to-the-minute glance at your holdings.

The quotes included in both services are on a 20-minute delay—a lag that can be crucial if you're following a particularly volatile issue. Trade-Plus allows C. D. Anderson and Fidelity subscribers to receive real-time quotes for a $75 monthly surcharge, which covers licensing fees from the New York and American exchanges and NASDAQ.

Both Fidelity and C. D. Anderson claim that you can download on-line data to a spreadsheet program such as *1-2-3, Multiplan,* or *VisiCalc*. Fidelity imposes an additional charge for this service; C. D. Anderson does not.

Although both discount brokerage houses currently offer largely similar products, you can expect that to change soon. Both firms plan to tack enhancements onto their services. Fidelity has already added a few features, enabling investors to obtain margin and cash account balances on line and use a direct computer-to-computer link. The new link connects the Trade-Plus host directly to Fidelity's computer, which in turn receives data from the floor of the New York Stock Exchange. For order entry, this link is transparent to the individual investor, but the direct connection spares Fidelity personnel from having to rekey data manually—and that means faster trade confirmation for Fidelity's clients. The link also relays transaction reports to the investor's PC.

In addition, Fidelity is planning to allow subscribers to switch between the various mutual funds in the Fidelity family, buy and sell gold and other precious metals, and access Fidelity's asset management account. The monthly fee for Investor's Express remains $15, plus time-sharing fees (40 cents a minute during peak periods, 10 cents during off-peak hours).

Bargain Hunting

Like Fidelity and Max Ule, Unified Management Corporation of Indianapolis is attempting to lure investors to its on-line service—called Micro Computer Account—by keeping the entry cost low. In this case, there's no initial fee if you open an account of at least $1000.

John Formo, Unified's marketing director, suggests that service charges hinder acceptance of on-line trading. "Other services bill you for trading by imposing connect charges while you enter orders," he says. "We call that unfair." Accordingly, when you first sign on to Micro Computer Account, you're greeted by a menu that splits services into those that are free and those that bear a fee. There's never any charge for order entry, viewing your account, or leaving an electronic message concerning your account.

Fees are imposed for quotations and information from Unified's data base of more than 38,000 securities. Unified's quotes are neither real time nor on 20-minute delay; when you ask for a quote, a company representative must key your request into the system manually, which delays the process slightly. Connect charges run $15 per hour for peak time and $5 per hour for off-peak time.

If punching your order in and getting off line quickly is all you need, North American Investment Corporation is happy to oblige. North American claims that its NAICO-NET account provides the fastest on-line order entry in the industry. Company spokesperson Gary Lavigne notes that NAICO-NET orders don't need to be rekeyed when they are verified, thus expediting order entry. North American charges an initial $19.95 sign-up fee. Beyond that fee, North American bills connect time only for access to market data and research information.

In addition to promoting the speed of its service, North American is touting its information-retrieval capabilities. According to Lavigne, NAICO-NET's library of information sources (primarily industry and investment newsletters) is sizable—and growing rapidly. Interestingly, he notes, a number of North American's customers first learned of the on-line service while doing investment research on NAICO-NET.

Browse—Then Invest

The notion that investors hunting for information will also partake of on-line brokerage services is behind the new Investor Service offering from The Source. Developed in association with Spear Securities of Los Angeles, the service is designed to appeal to current Source customers, who can trade without an initial fee.

Salient features of this Investor Service include automated portfolio management (with up-to-date record keeping and tax information), on-line trade confirmation, and access to an array of investment data bases. The Source is courting active investors by offering real-time stock quotes for a monthly fee of $18.50, significantly lower than charges imposed by Fidelity or C. D. Anderson. Delayed quotes for stocks and options are also available at no extra charge.

Spear Securities imposes a higher minimum brokerage commission than some other discount brokers, but Ira Belsky, Spear's executive vice president, attributes the difference to the firm's bid to attract high-volume traders (who pay proportionately less per transaction). "We see a market for discerning, independent investors who appreciate the new technology—and who want to do business with a firm that lets them use this technology to make better investment decisions," Belsky says.

Bound for Glory?

It seems inevitable that the role of the PC in serving the individual investor will expand, especially as personal computers proliferate. But beyond such a general assessment, it is difficult to gauge the future of on-line investing.

If on-line investing is to become a major force in the investment community, investors must clearly demonstrate that these services are in demand, and brokerage firms must be able to offer on-line trading at a profit. The jury is still out on both requirements.

Substantial numbers of investors have yet to embrace these still-emerging services. Most firms have between 200 and 500 subscribers. At this writing, slightly more than 1000 clients have reportedly

hopped aboard Fidelity Investor's Express. Still, at these totals, all services are loss leaders; that is, they're more a means of attracting new clients and holding on to existing ones than of generating big profits.

The low numbers can be attributed to a relatively quiet marketing effort among on-line services. Numerous market veterans contacted in connection with this article professed ignorance about the existence of on-line trading. With the exception of Fidelity, The Source, and Chemical Bank, the firms offering on-line services are small discount brokers who lack the funds to promote their services aggressively.

But the services themselves may also need to be refined further. System documentation is generally poor, and products are not always as clear as they could be. Both factors may be deterring computer novices from taking the on-line investment plunge.

In addition, as long as on-line trading remains the province of discount brokers, those investors who seek advice will have to stick to their phones. For good or ill, there are some compelling reasons why on-line trading is apt to be the bailiwick of discounters for some time.

Cut-Rate Brokerage

Discount brokerage firms, which didn't exist before brokerage fees were deregulated in 1975, provide services that differ from those of full-service brokerage firms (such as Merrill Lynch and Shearson/American Express). Discounters sell only execution services and rely on volume to ensure profits. Because they advertise low rates and toll-free telephone numbers, they don't need commissioned brokers to bring in business. Their account executives are salaried; thus their incomes are not affected by customers placing orders by computer. Full-service firms, by contrast, have problems with any order entry system that bypasses the broker.

It's a safe assumption that on-line investment will grow in lockstep with the discount brokerage industry, so electronic trading is likely to experience slow, steady growth in the years ahead. Since 1975 discounters have done quite well. According to the Securities Industry Association, a trade group, discount brokerages have increased their market share of retail commissions from 12.6 percent in 1982 to 18 percent in 1983. As more money center banks offer discount brokerage services, on-line trading will probably benefit from increased promotional efforts.

Although full-service brokerage firms are not letting this latest innovation pass them by completely, some remain skeptical about the value of on-line trading. Among the skeptics is E. F. Hutton's Lee Greenhouse, vice president of PC services. "Most investors do not need real-time quotes and electronic order entry," he says. "The real need is for better information to support the investment decision."

Although full-service brokerage firms are not letting this latest innovation pass them by completely, some remain skeptical about the value of on-line trading.

Toward that end, E. F. Hutton recently introduced Huttonline, an on-line service that offers instant account access, electronic mail, quotes on 20-minute delay, and selected research information to people equipped with PCs. Huttonline is a unique service from a full-service brokerage firm, but it does not permit trade order entry. E. F. Hutton charges $17 per month for the service, which entitles subscribers to 2 free hours of use. Beyond the 2 hours, Huttonline costs 12 cents per minute.

Safe at Home

If on-line trading flourishes, it will do so because it enables investors to enter orders at any hour of the day or night, any day of the week. As Max Ule points out, "Most people who have personal computers at home work during the day and don't have access to their hardware." Fidelity's Eric Kobren estimates that at least 50 percent of all on-line orders are entered during evening hours or over the weekend. Since all the on-line services can execute orders during off-hours, it is likely that investors will choose

View From Wall Street: An Interview With Ulric Weil

Roy Katz

PCs and modems have made executing stock trades a snap, but investing wisely has not become any easier. Although high technology has put brokerage firms on the desk top, the high-tech field itself is no longer enjoying an unrestrained heyday on Wall Street–as Ulric Weil knows.

Weil, a principal with the New York investment banking firm of Morgan Stanley & Company, is among the financial community's most respected computer industry analysts. Weil makes the buy and sell recommendations on computer securities for his firm's corporate clients.

Weil joined Morgan Stanley a decade ago after a period with Lehman Brothers. Before moving to Wall Street, he spent 15 years in management with IBM. Weil has predicted that the personal computer industry and its associated technologies (dedicated word processors, small business computers, and work stations) will grow from the current worldwide market of $15 billion to $50 billion by the end of the decade.

PCW: Until quite recently a great deal of venture capital was going into small "garage-type" operations that manufacture personal computers and the like. Into which technologies is venture capital now flowing?

Weil: Money continues to flow in some of these traditional directions, but computer-aided design and computer-aided engineering companies are in substantial favor right now. Venture capital is also going into such fields as advanced work stations and into the telecommunications side of personal computers–networks and voice recognition.

PCW: What factors do you consider when making your buy and sell recommendations for Morgan Stanley's clients?

Weil: I look at the size of a company's market share and whether that market share is increasing, staying the same, or decreasing. I review that company's research and development spending, profitability, and operating margins. In all of these areas the rate of change is critical. I also compare rates of growth versus industry expectations. Is a company growing as fast as, faster than, or not as fast as its industry generally?

I also scrutinize the firm's balance sheet to determine whether the company has enough cash to fund itself. Is external financing necessary to maintain growth? What are its equity and cash flow ratios [the total of current assets divided by current liabilities]? Then I feed most of this information into my computer–an Apple, by the way.

Still, most of the real analysis is of a judgmental nature. Once you have a feel for the various quantitative things, there's a subjective element

Investment analyst Ulric Weil

that resists quantification. It's often a matter of meeting the management and then making a judgment on the basis of having looked them in the eye. Is management really competent? Entrepreneurial? Forward looking? Do managers really understand their industry? Is their orientation more toward marketing or engineering?

PCW: Smaller firms are thought to have more nimble, responsive managers, which is particularly crucial in the computer field. What we're seeing more of today, however, is the entrance of companies closer to IBM in size and stature. How do you think such heavyweights as AT&T, ITT, and NCR will fare in the personal computer marketplace?

Weil: As far as AT&T is concerned, its real impact will be felt in the area of operating systems. UNIX is becoming an industry standard, although there is some question about which version will emerge as most popular. Most hardware vendors will eventually offer UNIX or are offering it now. Even IBM has adopted a version of UNIX, and that mutes the battle somewhat.

PC-DOS and UNIX each have a place, although for sophisticated multiuser, multitasking applications, UNIX is the operating system of choice.

PCW: Do you believe that AT&T, Burroughs, and other data processing giants will be able to carve out decent-sized market shares?

Weil: I don't know what could be considered decent, but offhand I'd say those firms will have to be content with single-digit market shares. Getting a substantial share of the market is a difficult thing to do at this stage of the game.

PCW: In the long run, are software firms likely to do better for their investors than hardware firms, particularly in light of the apparent glut in personal computer hardware?

Weil: Not necessarily. I anticipate a glut in software—and soon.

PCW: That seems to fit with your prediction that the retail price of software will eventually settle at around $25 a package. How does that figure square with the very real prob-

lem of copy protection and development costs that often run from $10 to $20 per line of code?

Weil: It's the lack of any serious manufacturing costs that will bring the price of software down. Success in software is strictly a matter of volume. You may spend $10 million to develop a software package, but if you anticipate that perhaps 5 million users will buy the program at $25 a package, that's $125 million. There's potential for huge profits.

PCW: What do you believe are the critical factors for success in the high-tech marketplace during the 1980s and beyond?

Weil: Aside from offering a product that the market needs and wants, a company must have a product—hardware or software—that is technologically advanced. That's a prerequisite. Beyond those requirements, good marketing is the key to the game. Because of the intense competition, marketing outweighs just about everything else.

For example, IBM did almost everything right when it introduced the PC in 1981. At the time, the PC was the first serious 16-bit machine on the market. IBM correctly identified the market and addressed it in a major way. What's more, IBM priced its product right and struck a very responsive chord in the marketplace.

By contrast, the message that emerged from the collapse of Osborne Computer is simple but powerful: high-tech businesses have to be managed by people who understand business and are not only entrepreneurs.

their service on the basis of other factors: market information, proprietary research, and cost.

On-line trading has not yet caught fire on Wall Street, but the Securities and Exchange Commission (SEC) is already assessing the impact of electronic trading on markets and investors. While questions still outnumber answers, the regulatory agency generally supports the new technology.

"We have a few concerns, but on balance we're very positive about using personal computers to trade," says Michael Simon, senior special counsel at the SEC. These concerns broadly touch three areas: market information, surveillance, and suitability. All three are expected to form the substance of a forthcoming SEC statement concerning on-line trading. Simon says the SEC is committed to ensuring that all investors, on line and off, are privy to the same market information (such as real-time quotes). As increasing numbers of investors trade on line, the impact of using instant market data is certain to be significant. (Obviously, real-time quotes are an issue only when the market is open.) For now, however, there appear to be no other regulatory obstacles to the growth of on-line trading.

Thomas Meyers, president of the American Association of Microcomputer Investors, a New Jersey-based nonprofit organization that publishes a newsletter for investors with PCs, is optimistic about the prospects for electronic trading. Meyers suggests that growth will be "substantial, but not dramatic—at least initially.

"I see the computer as a natural extension of the way that people invest," says Meyers. "I think that eventually all brokerage firms will offer discount rates. I also believe they will unbundle their services to individuals as they now do for institutional investors. When this happens, you'll be able to buy research, investment advice, and trading through a computer and pay only for what you actually use."

Whatever its future, on-line trading is a viable service right now. It offers distinct benefits to certain investors, and more than one user has reported a sense of power at trading stocks from the comfort of an easy chair.

Michael Shapiro, a financial writer based in New York City, is the author of a forthcoming book on computerized investing.

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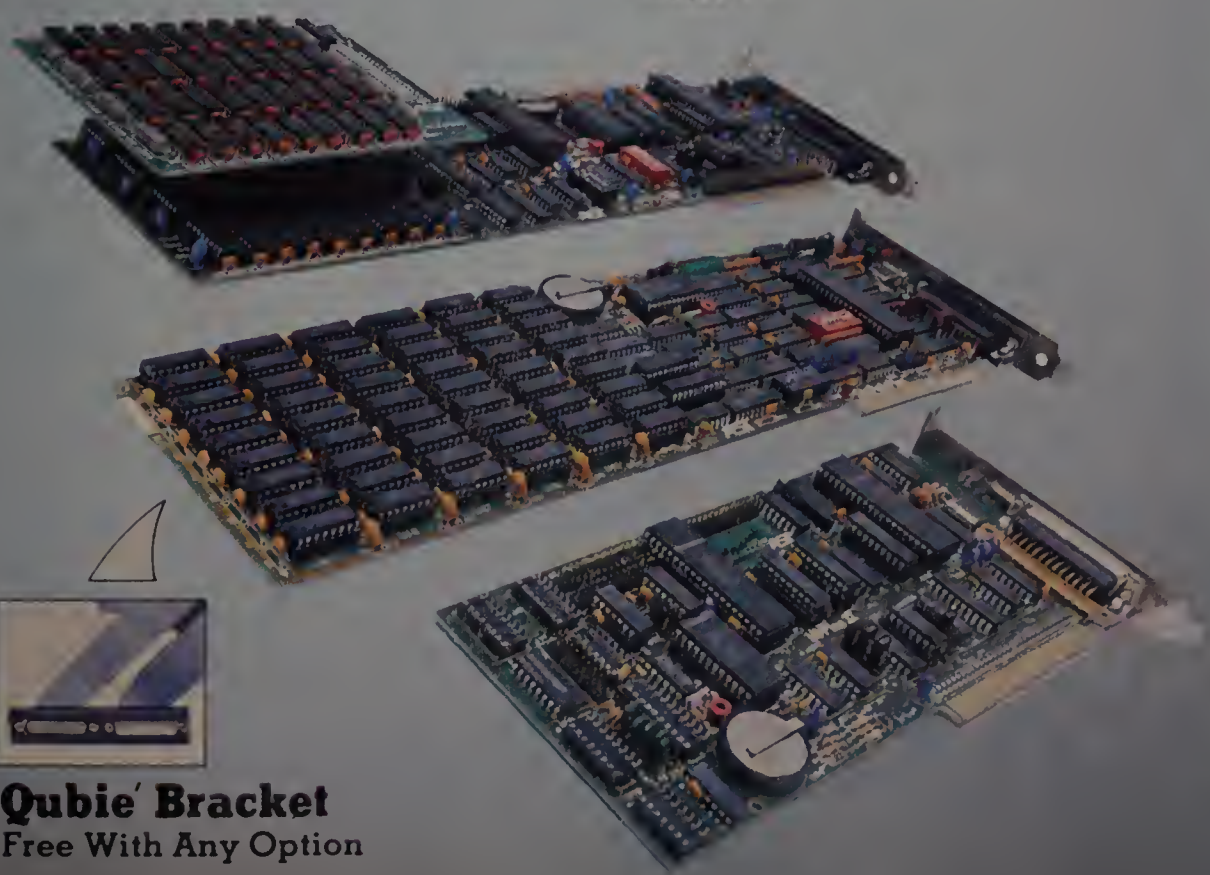

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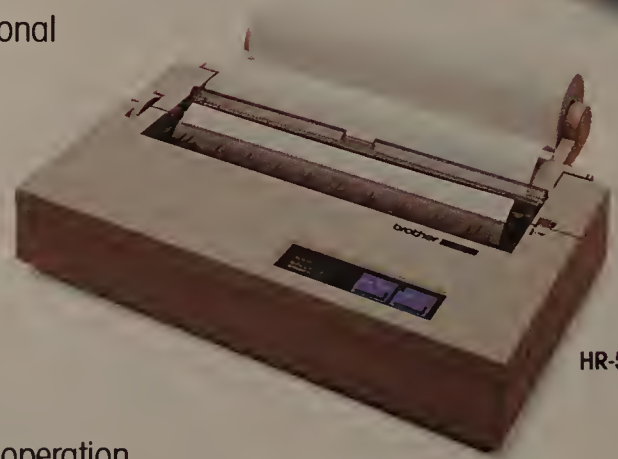

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Compatibles Update

The latest developments in the PC-compatibles marketplace

Tandy pursues the PC standard with a pair of aggressively priced machines, and Rolm breaks ground with a computer/phone. Compatibles Update also assesses the ITT Xtra and visits an all-compatibles retailer in New England.

Ken Greenberg

Compatibles Update keeps tabs on the growing market of personal computers that emulate the IBM standard. The column features news on hardware and software as well as brief system reviews and insights into the legal and marketing issues that affect compatibility.

Trends

Tandy's Price Wars

Tandy Corporation has recently expended a good deal of energy attempting to shed its image as a purveyor of "schlock" merchandise. Tandy, Radio Shack's parent firm, is big and ubiquitous (its outlets outnumber McDonald's nationwide) and longs to be regarded as a serious player in the personal computer derby.

Both the Tandy 2000, an 80186-based machine, and the Model 100 lap-size computer have succeeded in winning plaudits for the company. With the Tandy 1000, the company's newest offering, the folks at Radio Shack have done little to dispel another popular notion about their products: they're comparatively easy on the wallet.

The company's slogan for the highly PC-compatible Tandy 1000 is designed to hit you where it counts: "The best computer $2000 can buy . . . for only $1199." That's a mighty nice price for a machine that in many ways resembles the PC. Some of the specs are familiar—an 8088 microprocessor, 128K of RAM installed, one 5¼-inch half-height 360K floppy disk drive, and a 640- by 200-pixel display—but Tandy is also including as standard equipment a number of items that are available as options on the PC. The 1000 comes with three-voice sound, a combination monochrome/color graphics board, a parallel port, joystick and light-pen ports, MS-DOS, GW BASIC, and Tandy's proprietary *DeskMate* integrated software. *DeskMate* features six applications (word processor, spreadsheet, filer, calendar, mail, and telecommunications) as well as a calculator, a phone list, and an assortment of other functions.

The machine's 90-key keyboard is identical to the Tandy 2000's. Tandy has departed from the PC's design by putting the function keys across the keyboard's top row. The layout is consistent with the general compactness of the unit—the 1000 occupies less desk space than the PC.

The Tandy 1000 promises PC compatibility and sports a price tag of $1199.

A monitor is not included in the machine's $1199 list price, however. Principal options for the 1000 include an internal 300-bps

modem, an RS-232C interface, a 128K RAM expansion board, a second floppy disk drive, and a hard disk.

Tandy seeks to position the 1000 as a full-fledged PC compatible–at PCjr prices. But all this economizing hasn't come about without a compromise or two. The 1000's three expansion slots accept boards up to 10 inches long; the PC's five slots accept boards that are slightly more than 13 inches long. Unlike the PC (but like the PCjr), the 1000 lacks a DMA (direct memory access) chip and a DMA socket on the motherboard. (A DMA chip speeds up program execution by handling the movement of data from RAM to peripherals, freeing the CPU from this chore.) The DMA for the 1000 is available on a memory expansion board that brings the machine's total RAM to 256K.

PC software compatibility seems assured. The company reports that the machine runs *1-2-3* and *Flight Simulator* off the shelf, both of which make direct calls to the BIOS ROM. Radio Shack will be stocking some 40 major packages, including *Multiplan, Friday!, Microsoft Word, DR Graph,* and the *pfs:* family of programs. Tandy has even sought PCjr software compatibility, where possible.

Why enter the clone market now, more than a year after the initial explosion of PC workalikes? "Our goal was to capitalize on the availability of PC-compatible software and provide good price/performance value at the same time," says Tandy marketing executive David Frager. Frager credits Tandy's "distribution strength" for the company's ability to offer its PC compatible "at an unsurpassed price."

The Tandy 1200, a PC XT compatible reportedly manufactured by Tandon Corporation

It's been an active season for the Fort Worth-based company. The 1000 premiered in November, six weeks after Tandy introduced the Tandy 1200 HD, its PC XT compatible. Unlike the 1000, an entirely homegrown product, the Tandy 1200 is reportedly the handiwork of Tandon Corporation, the southern California disk drive manufacturer.

Tandy describes the 1200 as "functionally identical" to the XT. The unit includes an 8088 CPU, a 10MB hard disk, one 360K 5¼-inch floppy disk drive, 256K of RAM expandable to 640K, an 8087 socket, a parallel port, an 84-key IBM-style detachable keyboard, and five expansion slots. A video display board and a monitor are not included in the Tandy 1200's $2999 list price. Both new Tandy models are available at Radio Shack stores everywhere. Of course.

Rolm, This Is IBM Calling

It's probably somewhat cynical to view certain new products from certain vendors as evidence of an ongoing parry-and-thrust between IBM and AT&T. But it may be more than happenstance that Rolm, the telecommunications firm that IBM has recently acquired, is now brandishing a PC compatible that has a built-in digi-

tal phone. Known as Cedar, the unit features an 8088 microprocessor, 384K of RAM, a detachable keyboard, two half-height 5¼-inch 360K floppy disk drives, a parallel printer port, MS-DOS, GW BASIC, a dual-mode (text and graphics) display, and the ability to transmit voice and data simultaneously.

Cedar isn't your garden-variety PC clone, however. At $4995 ($4245 when purchased in quantities greater than 100), Cedar is fully equipped but not exactly an open-architecture machine. It lacks expansion slots and doesn't accept a hard disk. It won't run any PC communications packages (although Cedar is bundled with its own sophisticated communications software and a 19,200-bps modem). Nor will you be able to see or buy Cedar at retail outlets; Rolm's direct sales force is the exclusive source of supply.

In fact, Cedar isn't a standalone PC at all, and you can't use it in lieu of a phone. You need a nearby Rolm CBX, the company's proprietary PBX (private branch exchange). Rolm has installed 15,000 CBXs to date, representing an aggregate of 2.5 million lines. Rolm is hoping that Cedar will boost sales of its CBX system and enable current customers to get more from the CBXs already in place.

Enter the IBM connection. Rolm, a major supplier of PBX systems, will be IBM's major source of future telecommunications products. If nothing else, Rolm is in the forefront as IBM jousts with AT&T for a Fortune 1000 market share.

Rolm's Cedar features crisp graphics, communications software, and a digital phone—all you need is a Rolm CBX.

Might IBM have had a hand in designing Cedar? "No comment," says a Rolm spokesperson. Published reports indicate that some IBM sales reps received training in the Rolm product line at the company's Silicon Valley headquarters. Other sources speculate that Rolm had carte blanche to duplicate IBM's copyrighted BIOS ROM.

If Cedar is a hit, who knows what will follow? Your move, AT&T.

For Compatibles Only

In the true spirit of competition, what was once a cacophony of MS-DOS voices has been reduced to a mild roar. But the recent

muting of the chorus of PC-compatibles manufacturers appears to have little to do with the strength of MS-DOS as the operating system of choice among consumers.

CompuShop, a Dallas-based retail chain that maintains outlets throughout the Southwest, has dropped Apple from its tree. The 50-store operation now limits itself to the PC and a few clones (Compaq, AT&T, and Mindset, primarily). CompuShop officials publicly described the move as a software decision, a means of paying fealty to one operating system.

Norman Prevett, the proprietor of Systems Innovations of Lowell, Massachusetts, and Peterborough, New Hampshire, understands the move and has gone CompuShop one better. It isn't that he dropped Apple or IBM; he never bothered to carry either.

Prevett's game is PC compatibles–without the PC. For virtually every PC work-alike, snuggling up next to IBM on dealer shelves is an arduous task. At Systems Innovations, there are nothing but clones: Zenith 150s, Seequa Chameleons, Coronas, a few Eagles, a NorthStar Dimension here and there. Like CompuShop, Prevett's aim is to eliminate confusion and unite behind a single operating system.

Systems Innovations isn't a curiosity because Prevett is stocking IBM look-alikes and not the real thing but because his operation confirms that PC compatibility has assumed a life of its own in retail channels.

Prevett's loyalty to compatibles reflects his business judgment more than an unflagging devotion to MS-DOS or the PC standard per se. Prevett says his customers want a product capable of handling software that solves their business problems. "From a practical standpoint, PC compatibility may not be a big factor to a given customer, but it is a major consideration for the market as a whole," he observes.

Half of Prevett's customers wear corporate pinstripes; the other half hail from small retail and professional operations. He intends to wean corporate buyers from the PC to something as efficient but less expensive.

"Corporate types definitely want the big blue letters," he says. "Some purists won't even talk if they don't see 'IBM'. For them we keep a PC in our showroom. Once they compare price and performance against IBM, we find that a sale [of a compatible] is self-evident."

Prevett began his computer retailing career firmly under the Zenith umbrella and moved with that company into MS-DOS. "The PC standard has been adopted; it's not great, but it seems to exist, even if it's archaic," Prevett says. "Anyway, who's going to throw away their PCs?"

Discarding is one thing, but not buying is another. In the wake of the hectic summer of 1984, Prevett isn't sanguine about the prospects for the compatibles market in general. "IBM's price cuts stimulated the market a bit," he notes. "It had been expected, so people held back, then made a buying decision, and that produced a burst of activity. I don't think the cuts harmed any manufacturer's sales, but the cuts did hurt the profitability of smaller companies."

Eagle Computer is one of those smaller companies feeling the squeeze these days. Not surprisingly, the Eagle line of PC compatibles has lately become scarce at Systems Innovations. Prevett continues to stock Eagle-compatible peripherals and support Eagle's installed base, but that's it. "When it comes to Eagle, we're idling," Prevett says with a seeming tinge of regret. "In terms of performance, Eagle's machines were always very good. The majority of their problems lay in distribution–the company tried to bite off too big a chunk and now may be choking on it. The trouble is that if there's the slightest taint to a company, dealers are suddenly scared stiff and cut stock to the bone, reducing sales and fulfilling the prophecy right there."

Prevett predicts that when the shakeout can shake no more, the survivors will be the established, well-funded companies–not the start-ups. He suggests that smaller firms will soon run for specialty niches if they haven't already. "The ultimate end for most PC clone companies is acquisition by somebody big. Just watch, that will happen piecemeal during the next two years."

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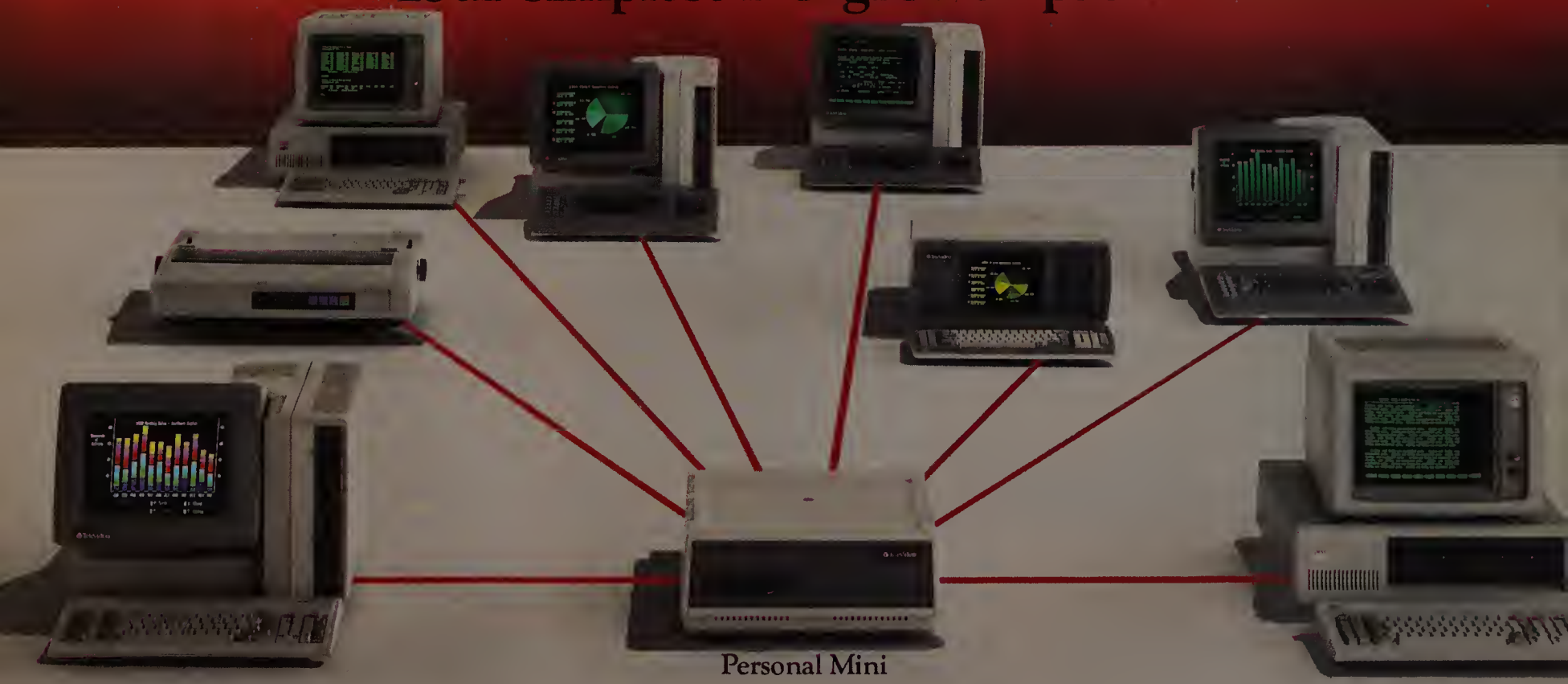

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Sperry Taps Corona

Another computer industry giant has turned to Corona Data Systems for a ready supply of PC compatibles. Sperry Corporation has struck a $46 million deal with Corona for an undisclosed number of repackaged Corona floppy disk drive and hard disk portables. The 18-month agreement lends credence to Corona's claim to be the dominant OEM (original equipment manufacturer) house in the PC-compatibles crowd. Corona also does private labeling for Docutel/Olivetti, Wordplex, and N.V. Philips.

Sperry is targeting the portable at industrial firms and selected vertical markets in the United States and Canada. Sperry reportedly gave Corona the nod over NCR, TeleVideo, Eagle, and Columbia. Mitsubishi Electronics supplies Sperry's PC-compatible desktop computer, quantities of which have been severely limited since the machine was introduced last year.

In Review

Xtra! Xtra! Another Clone!

What do you do if you're an enormous corporation specializing in telecommunications, and you see IBM making a killing in personal computers? If you're ITT or AT&T, you quickly come out with a clone to grab a market share and then sit back and decide what you're really going to do. Although AT&T's announcement caused more of a stir, ITT's Xtra beat AT&T's PC 6300 to market by about three months.

The ITT Xtra may be just another clone, but it's a well-designed one. The Xtra is solidly built, boasts near-total PC compatibility, and takes up 30 percent less desk space than the PC. It also has a company name that, for good or ill, projects a stable corporate image. International Telephone & Telegraph Corporation is hardly a fly-by-night concern.

The Xtra comes in four models, ranging from a 128K-RAM, one-disk-drive model to the top-of-the-line Model 4, which comes with 640K and a 10MB hard disk. You can expand one step at a time. For all models the attractive system unit measures 5½ inches tall by 14 inches wide by 15½ inches deep. This small size will be welcome if you've got an already cramped desk. The system unit can also be mounted vertically.

Inside the Xtra you'll find a motherboard with an 8088 microprocessor, 32K of ROM, and 256K of RAM. A parallel port and a serial port are built in, leaving free five full-length expansion slots, one of which will undoubtedly be taken up by a monochrome or color display board. The 5¼-inch floppy disk drives, which sit atop one another, can store 360K apiece.

The Xtra's power supply churns out 128 watts and can switch between the American standard voltage (95 to 132 VAC) and the European standard (180 to 264 VAC) at 47 to 63 Hz. The power supply is ventilated by an exceptionally quiet fan.

The Sperry Portable is equipped with Corona's high-resolution monochrome display.

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Trouble with the fan was the only problem I encountered with the Xtra I tested. When my Model 3 first arrived, the system unit continually shut itself off. Upon opening the unit, I found that the fan was not spinning properly, which caused the system unit to overheat and shut off. Apparently, the last person to work on the computer's insides had applied pressure to the casing, prompting the fan to stick. *PC World* Technical Editor Karl Koessel came to the rescue with a screwdriver and levered the casing off the fan. That was the last problem I had with the Xtra during several months of heavy use.

The keyboard is a Key Tronic with indicator lights on both the <CapsLock> and <NumLock> keys. The keys are set in an 8-inch-deep panel that provides ample room to rest your palms. The keyboard connects to the back of the system unit with a 6-foot-long shielded coil. For an extra $300 you can buy a mouse and a VisuALL mouse interface board from ITT.

The 14-inch monochrome monitor's claim to fame is its tilt-and-swivel base. Text display is available in green or amber (the amber is more yellow than orange), and the monitor supports 640- by 200-pixel graphics resolution.

The Xtra comes with ITT DOS 2.10 and ITT Advanced BASIC, a version of GW BASIC. Other standard software is available with ITT's name on it, but you don't have to buy these packages. I have yet to find any software written for the PC that doesn't work on the Xtra.

So why not buy an ITT Xtra? One reason is the price. Even after a 17 to 24 percent price reduction in June, various models are still selling for somewhat more than similar IBM configurations.

That could be why the machine is reportedly languishing on ComputerLand shelves. Officials of the retail chain—currently the exclusive channel for the Xtra—are said to be less than enthusiastic about the machine's sales. Despite ITT's hefty print and TV ad campaign for the Xtra, lagging sales have prompted a shake-up in the Information Systems Division executive suite.

Corporate politicking aside, if features like good ergonomics, a swivel monitor, and a small footprint are important to you, the Xtra may be worth its cost. Otherwise, you may want to wait for the next round of price cuts.
—Eric Brown

Software

Tandy Promotes Accounting Series

Breaking with tradition, Tandy Corporation has begun marketing software that doesn't wear the Radio Shack logo. Radio Shack out-

lets are now carrying Great Plains Software's *Hardisk Accounting Series* for the Tandy 2000. Modules include *General Ledger With Financial Reporting and Budgeting, Accounts Receivable, Accounts Payable, Payroll,* and *Inventory Management With Point of Sale Invoicing.* All modules can be integrated or used individually and are available through Tandy's Express Order Software program.

dBASE II for the HP Portable

Ashton-Tate has released a version of *dBASE II*, its popular data management package, for the HP 110, Hewlett-Packard's 9-pound portable. HP dealers are distributing the program at a list price of $500.

Rallying Around AT&T

Although AT&T's PC 6300 has crept slowly onto dealer shelves, software vendors continue to hop aboard the (expected) AT&T juggernaut, and Fox & Geller is among the latest to do so. AT&T Information Systems (AT&T-IS) has begun distributing Fox & Geller's line of *dBASE II* and *dBASE III* enhancement products, including *Quickcode, dGRAPH,* and *dUTIL.* AT&T-IS is also distributing *OZ,* Fox & Geller's office management package.

Graphics Package for Rainbow

DEC has given *GrafTalk,* Redding Group's business graphics package, its Classified Software Program stamp of approval for the Rainbow. *GrafTalk* relies on both menu and command modes and includes a custom chart creation feature, a built-in editor, and a mini-spreadsheet.

For information on other new PC compatibles, see Just Announced. Compatibles Update *welcomes contributions from readers, and we'll pay up to $50 for the items we use. Please include your name, address, and phone number with your contributions. Send them to* Compatibles Update, PC World, *555 De Haro St., San Francisco, CA 94107.*

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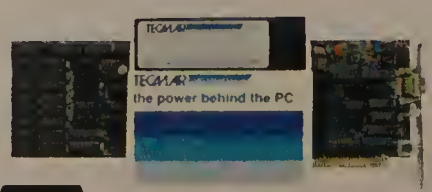

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Our standalone modem, the 212A/1200E can be used with any computer or terminal with a RS-232C serial port. You can use any Hayes compatible communications software on anything from an Apple to a Zenith. Many owners of IBM PC's are using it because they lack available expansion slots, or have more than one computer they want to use their modem with.

It's attractive gold anodized case houses seven status lights (who says low prices means a shortage of features). It fits comfortably under a standard telephone. It is also a 212A compatible auto-dial, auto-answer modem which supports all Hayes software commands. Even the switch settings are the same, so any software giving recommended switch settings for a Hayes modem can be used, without knowing what the switches do. There is a volume control knob for easy adjustment of the speaker's output. Included in the package is modular phone cable, a cable to hook it to your computer or terminal, and instruction manual. Choose the communications package right for your needs, and you're ready to go!

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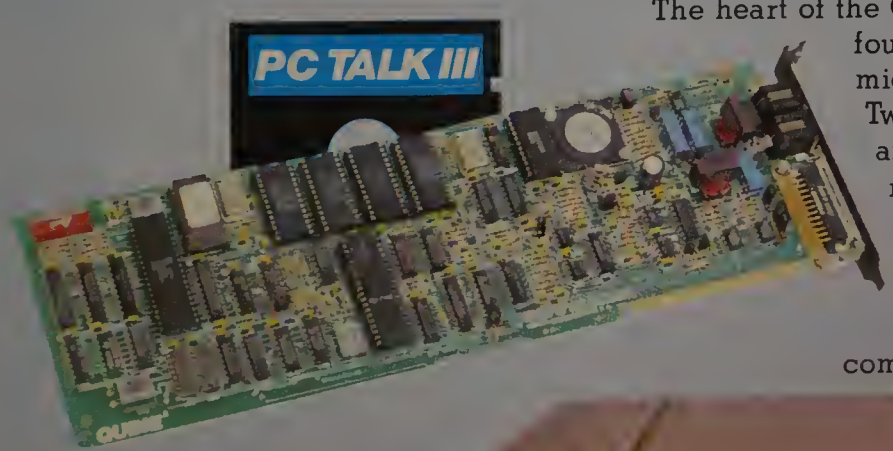

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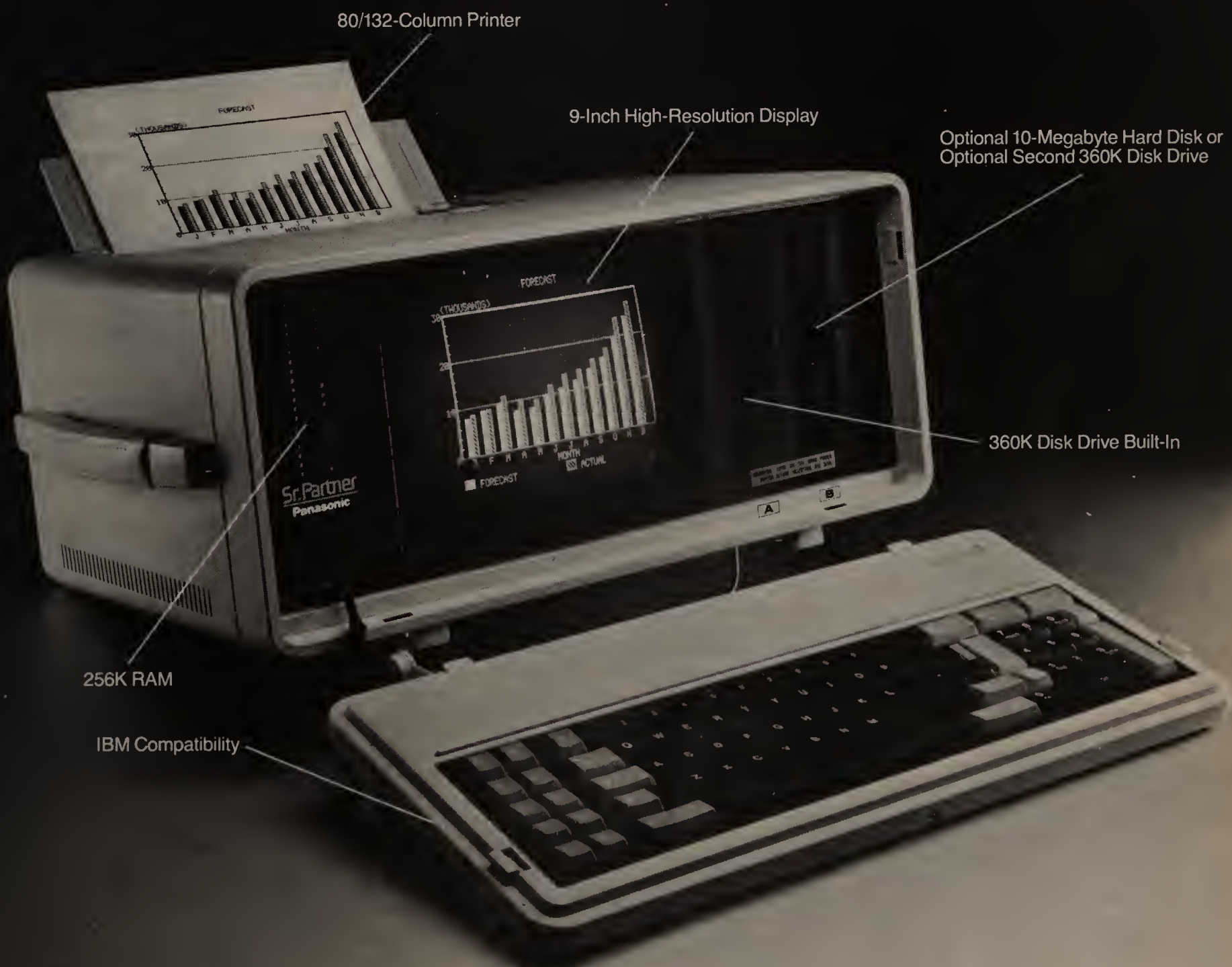

*[illegible] offer subject to change or withdrawal at any time without notice. **One-year limited warranty, 6 months on thermal printer head. Carry-in or mail-in service.
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★ 12" Amber, #300A		$ 199	$ 149
★ 12" Amber, #310A for IBM-PC		$ 230	$ 159
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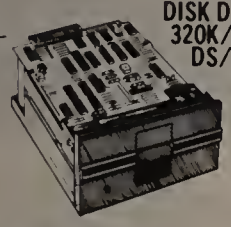

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	Game Port for SixPak	$ 50	$ 39
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Quadboard II, 64K, expand to 256K, 2S/CC		$ 395	$ 265
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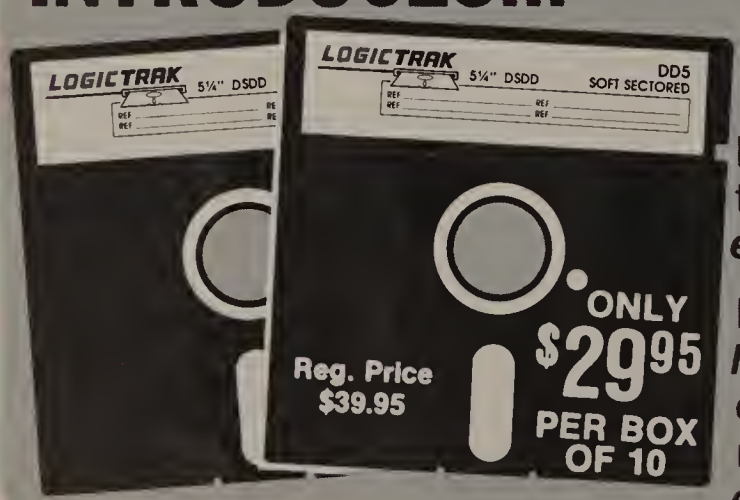

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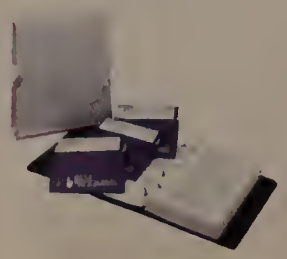

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Word Processing '85

Eric Brown

As the personal computer community celebrates its tenth anniversary, the artificial divisions between words, numbers, and pictures are beginning to blur. Software integration enables us to view all data as interrelated ideas, and the practical meeting ground for these ideas is the word processed document. Word processing software is moving beyond the mere manipulation of words to grapple with the formation and expression of ideas. The two complex programs covered in the "Hands On" section (*The Idea Processor* in the article "Due Processing" and *Microsoft Word* in "Well-Chosen

Words") may well represent the state of the art in PC word processing. The following three reviews represent new trends in this changing software category. *THOR* expands the definition of word processing by including a text data management system (TDMS) for searching for and retrieving text files. *WordMARC*, the descendant of a mainframe program, is aimed at the office environment. The first PC word processor developed by IBM, *DisplayWrite 2*, signals the trend toward emulation of dedicated word processing systems. Table 1 on the next page compares the features of these programs.

Table 1: Word processing features of THOR, WordMARC, and DisplayWrite 2[1]
Legend: ● Yes ● No

		THOR	WordMARC	DisplayWrite 2
Ease of use	Menu-driven	●	●	●
	Function-key-driven	●	●	●
	In-context help screens	●	●	●
	Not copy-protected	●	●	●
Documentation	Index	●	●	●
	Tutorial	●	●	●
	Error-message support	●	●	●
Screen formatting	Shows text as printed	●	●	●
	Automatic reformatting	●	●	●
	Adjustable margins	●	●	●
	Right justification	●	●	●
	Centering	●	●	●
	Shows page, line, and column	●	●	●
	Shows memory remaining	●	●	●
	On-screen boldface and underlining	●	●	●
	On-screen pagination	●	●	●
	On-screen tab ruler	●	●	●
	Split screen (shows two files)	●	●	●
	Hard indent word wrap	●	●	●
	Decimal tabs	●	●	●
	Flush right tabs	●	●	●
	Soft hyphenation	●	●	●
	Horizontal scrolling	●	●	●
	Headers and footers	●	●	●
	Alternating-page headers and footers	●	●	●
	Automatic footnoting	●	●	●
	Widow and orphan control	●	●	●
	Extended character sets	●	●	●
	Inverse video highlighting	●	●	●

[1]Explanations of most features can be found in "New Dimensions in Word Processing" in this issue.

		THOR	WordMARC	DisplayWrite 2
Cursor movement	By character	●	●	●
	By word	●	●	●
	By sentence	●	●	●
	By paragraph	●	●	●
	By page	●	●	●
	By screen	●	●	●
	To top and bottom of screen	●	●	●
	To beginning and end of line	●	●	●
	To beginning and end of document	●	●	●
	To a specified line	●	●	●
	To a specified page	●	●	●
	Mouse support	●	●	●
Search and replace	Global	●	●	●
	Pauses for approval	●	●	●
	Ignores case	●	●	●
	Wild-card search	●	●	●
	Searches backward	●	●	●
	Whole word only	●	●	●
	Multifile search	●	●	●
Delete	By character	●	●	●
	By word	●	●	●
	By line	●	●	●
	To end of line	●	●	●
	By sentence	●	●	●
	By block	●	●	●
	Word to left	●	●	●
	Undo delete	●	●	●

Legend: ● Yes ● No

		THOR	WordMARC	DisplayWrite 2
Other editing	Block move	●	●	●
	Block copy	●	●	●
	Writes block to new file	●	●	●
	Reads file into document	●	●	●
	Moves blocks between files	●	●	●
	Column move	●	●	●
	Insert/overtype toggle	●	●	●
	Transposes characters	●	●	●
	Changes case	●	●	●
Printing	Proportional spacing	●	●	●
	Subscript/superscript	●	●	●
	Print queuing	●	●	●
	Prints multiple copies	●	●	●
	Print spooling	●	●	●
	Prints selected pages	●	●	●
	Pauses for text entry	●	●	●
File management	Can create ASCII file	●	●	●
	Save file/continues editing	●	●	●
	Continually saves to disk	●	●	●
	Deletes file	●	●	●
	Renames file	●	●	●
	Merges files	●	●	●
	File size limited only by memory (RAM)	●	●	●
	File size limited only by disk storage	●	●	●
	Recovery from disk full	●	●	●

		THOR	WordMARC	DisplayWrite 2
Special features and writing aids	Macros	●	●	●
	Boilerplate glossary	●	●	●
	Format glossary (style sheets)	●	●	●
	Spelling checker	●	●	●
	Grammar checker	●	●	●
	Thesaurus	●	●	●
	Text data management system (TDMS)	●	●	●
	Outline organizer	●	●	●
	Mail merge	●	●	●
	Math capability	●	●	●
	Automatic indexing/table of contents	●	●	●
	Numbered lists	●	●	●
	Supports color	●	●	●

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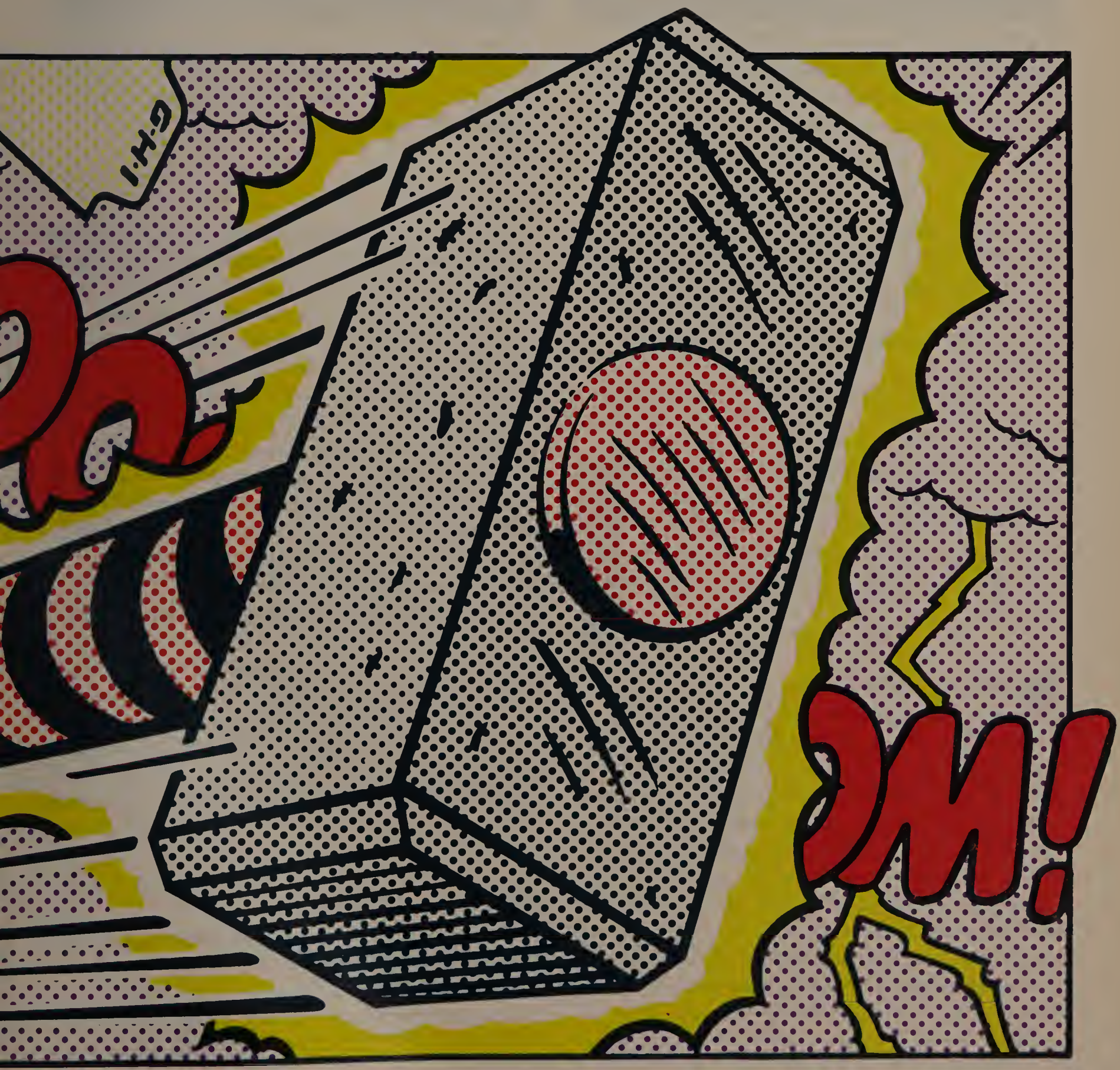
THOR: New Thunder

What happens when you mix word processing, data management, and character graphics in a single package? The ability to categorize, sort, and retrieve text files by keywords makes THOR a powerful writing tool.

Elizabeth Wallace

THOR, although powerful, bears no other relation to the frightening Norse god of thunder; the name is an acronym for *thought organizer.* The program combines word processing, character graphics, and a text data management system (TDMS) in a unique way, defying a number of software rules. So far, only a few new programs, such as *The Idea Processor,* provide a TDMS (see "Due Processing" in this issue), but this text management feature may become standard in future word processing programs.

In the clever *THOR* demo, programmers Dave Rossi and Paul Spreen walk the user through a question-and-answer section, which concludes: 'THOR is a great-looking package, but how can I use it?' Then the answer pops up on the screen: 'Just think of something that you would like to organize, and you now have a use for THOR.'


G.H.!
OH!

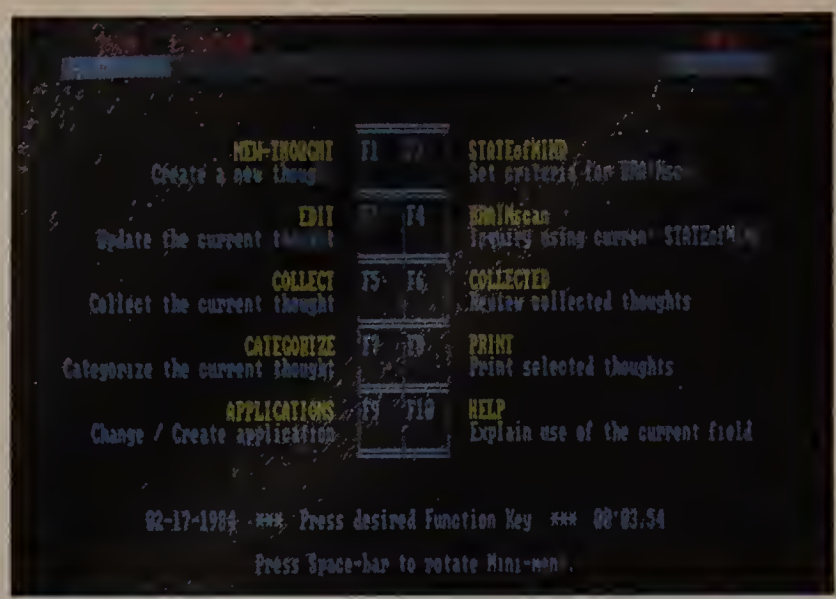


Figure 1: THOR's main menu. Fastware chose to use common English terms in place of traditional data base management jargon.

Figure 2: When you store a new thought, a category menu appears. Here you can assign up to five keyword categories, with content keywords on the bottom row that can be used to further define a search.

My life! I thought eagerly. That may be asking too much of any program, but *THOR* has helped me organize my daily journal, the notes for this article, and a multitude of word processed files, whose 8-character file names were getting jumbled in my memory.

Anyone with letters to write, projects to organize, or research to do will find *THOR* helpful. Programmers can use it to keep track of subroutines; writers, to maintain journals and search through them for useful ideas, details, and descriptions. Students will find it a good tool for taking notes, studying for tests, or writing papers. Businesspeople can use *THOR* to keep track of obligations, data, and deadlines.

Fanciful Function Keys

In both the program and the documentation, the programmers use words that human beings can understand. The main menu, which represents the function keys, describes the major functions in somewhat fanciful English terms that may offend the experienced computer user but should make sense to those new to data management (see Figure 1). Instead of 'opening a file', 'indexing' it by keywords, implementing a 'multiple-index search', and 'sorting a directory', you create a 'new thought', 'categorize' it, describe your present 'state of mind', and scan a list of thoughts in the resulting 'brainscan'. You can then go on to 'collect' (merge) your thoughts and even 'forget' (delete) them.

Can *THOR* really be that easy? In some respects, yes. *THOR* is a remarkably simple data management system to learn. Of course, it is not a relational data base, and it cannot merge data files and text into form letters or print reports in a custom format. Instead, it allows you to enter text in any format, then prompts you to categorize it five ways when you save it. (*THOR* loads and saves documents instantaneously, a real shock to anyone used to *WordStar*'s leisurely pace.) Each description needs to be fleshed out with an equally brief 'content'. The program also automatically categorizes each thought by the date of entry.

In this manner you can work on a number of projects simultaneously and store a large number of files without confusion. When it's time to put the pieces together, you go to the State of Mind and search on any or all of the descriptions. Related thoughts can then quickly be collected and printed in any sequence.

Leave It to THOR

Perhaps you are writing a paper on the popular culture of the fifties, and you have a section on television programs that discusses well-known variety shows, drama series, and situation comedies that were on the air in 1958. With *THOR*, notes on the various

Figure 3: A sample data base of fifties television shows on the Brainscan menu. Brainscan allows you to see all the thoughts in your application.

Figure 4: THOR's State of Mind menu, showing a search for all 1958 sitcoms that featured teenagers in a nuclear family. State of Mind lets you search by keywords (with numerical operators, if necessary), by date of creation, and by matching text.

programs could be categorized under the general heading **Year: 1958** and further tagged **Variety**, **Drama**, or **Sitcoms**. A thought discussing Wally's character development in "Leave It to Beaver" might be categorized as shown in Figure 2. To further define this show, you might tag the thought as **Sitcoms: Nuclear Fmly** (shortening *Family* to *Fmly* to meet *THOR*'s 12-character heading restriction) and **Nuclear Fmly: Teenagers.**

Similar thoughts are entered in DOS files called applications (which you can review by pressing <F9>). Whenever you want to review or gather your notes, <F4> (Brainscan) will display all the thoughts in an application sorted by date of entry (see Figure 3.) The Brainscan shows the first line of each thought (usually a title) and the first category description and content. If you now want to search the files for 1958 sitcoms that portray teenagers within a nuclear family, you go to the State of Mind (<F2>) and enter the appropriate keys (see Figure 4). Pressing <Esc> yields the Brainscan list in Figure 5.

The left boxes of the State of Mind screen relate to the top rows of the categorization box (categories), and the right boxes relate to the content boxes on the bottom row. The middle boxes are where you enter the search operators. The example in Figure 4 shows only the equal sign, but you can also include the timesaving caret operator (^) to search for a content that begins with a certain series of letters. If your contents are numerical (for example, significant dates, chapter numbers, and zip codes), you can use the greater than (>) and less than (<) operators with or without the equal sign.

For example, you can label each television show by the number of years it was on the air. To find out how sitcoms about nuclear families with teenagers

The fanciful English terms may offend the experienced computer user but should make sense to those new to data management.

fared in terms of longevity, you would reproduce the search in Figure 4 and, granted your thoughts are properly labeled, specify **Years on air**: => **5** to see how many of the shows lasted five or more years.

The addition of the Date of Entry and Matching Text search functions on the middle and the bottom of the State of Mind screen turns *THOR* into an extremely versatile TDMS. The Date of Entry function (which allows you to search for files created in a specified date range) is contingent upon whether or not you entered the date at the DOS prompt or if your PC has an installed clock/calendar board. The Match-

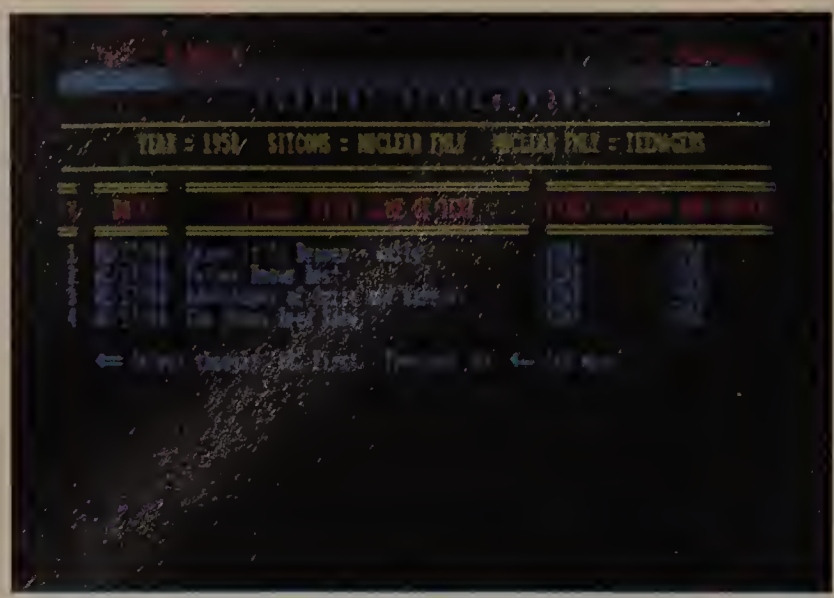


Figure 5: The Brainscan menu showing the results of the search shown in Figure 4. These thoughts can be collected and printed out as a single document.

Figure 6: THOR's graphics characters allow you to integrate simple charts and pictures with text.

ing Text function compensates somewhat for the editor's lack of a search and replace function. There may be occasions when you ignore the categories and search only by text strings within thoughts. For example, by adding the matching word **Wally** to the search pattern in Figure 4, you come up with the Leave It to Beaver thought, but the matching text function used alone would probably yield the same results.

If you forget the categories you've established (the limit per application is 255), simply press **?** <**Enter**> to see them all on the screen along with the number of thoughts in each category. You can then type the menu number, and the category will automatically appear in the category box. If you're still lost, a search for matching text of one to three words will probably do the trick. Matching text searches are much slower than searches by established categories, but they make the *THOR* data base enormously flexible.

Once a list of related thoughts has been created (as in Figure 5), you can use the <CursorRight> key to scroll through the thoughts in the order listed, print a list of categories and titles, print all the thoughts listed, or edit, print, or merge selected thoughts.

Before you can print the document, you must assemble it with the Collect function. After searching the Brainscan and coming up with a list of thoughts, you flip through the files and press <F5> to collect the thoughts in the proper order. Pressing <F6> allows you to review them. Then go to the print menu (<F8>) to choose various print options and print the collected thoughts in a single document or separately.

THOR allows you to have as many files of related thoughts as you like; the size of an application depends on disk capacity, since each application must fit on one disk. On a hard disk, maximum application size is in the neighborhood of 8MB. The size of each thought within the application file depends on how much RAM is available. A 128K computer allows for a thought of approximately five double-spaced pages; 192K accommodates a thought roughly six to seven times that length. *THOR* gives clear warning messages when RAM is running low or when a power outage may have damaged the data base. In the latter case *THOR* prompts you to use the simple Rebuild function to repair the application file.

A Simple but Sensible Editor

THOR's screen editor, accessed by pressing <F1> for New Thought or <F3> for Edit, has a sensible command structure that allows you to perform most word processing functions easily. However, the lack of block move, block copy, and search and replace functions will cause many buyers to scratch *THOR* off their shopping lists. The program has something called Cut and Paste, but don't be fooled. This feature does little more than split a paragraph and reformat it. *THOR* does have a Block De-

Figure 7: THOR's block graphics characters let you create maps and diagrams.

lete, which operates by asking how many lines you want to delete, but you cannot delete a word at a time. However, the program can delete to the end of a line and restore the line to its unedited state.

THOR always remembers the most recent margin and tab settings; when you load a document, it automatically assumes the margins and tabs of the last thought that was edited. If you go back to edit an old thought, and you have used other margins and tabs in the interim, you will have to change the margins and tabs manually. When you press the <Alt> or <Ctrl> key, a list of available options appears at the foot of the screen.

Matching text searches are much slower than searches by established categories, but they make the THOR *data base enormously flexible.*

In brief, what you see in the way of screen formatting is generally what you get, but what you get in the way of editing features isn't much. *THOR*'s editor may be all the word processing some people will ever need, but those with more complex formatting and editing needs may want to hold on to their current word processors.

Fortunately, *THOR*'s conversion capabilities make shifting between *THOR* and another program relatively easy. If you are too committed to your present word processing program to make a change, *THOR* can easily save passages to disk as standard ASCII files and read ASCII files into a *THOR* application. It can also receive files from major spreadsheet packages if the files are first saved to disk. Thus, a business can use *THOR* to categorize and keep track of a huge number of spreadsheets, as long as the tables are no wider than 80 columns.

An ideal use for *THOR* is organizing letters, articles, proposals, and other unrelated text files that are mixed together on disk. All the files can be created with a favorite word processor, passed into *THOR* for categorizing and indexing, then sent back to the word processor for further formatting or revision.

Character Graphics

Unlike most word processing programs, *THOR* comes with 12 graphics characters installed. I discovered these by accident; they were not mentioned in the manual. They appear as choices at the bottom of the screen when you hold down the <Alt> key. The first 4 are solid rectangles of varying shading and intensity, the fifth is a bright square, the sixth a vertical bar, and the remaining figures are lines and right angles that enable you to create boxes of all shapes and sizes. Each character can be displayed by pressing the <Alt> key along with one of the keys on the top number row.

Although *THOR*'s graphics can't be tied to statistical data to create business graphics automatically, you can make fairly professional charts by hand and include them in documents. You can also create illustrations, simple diagrams, and maps (see Figures 6 and 7). One interesting use for the graphics is animation. By making a series of drawings that change progressively for each new thought, you can create a simple cartoon. Line up the thoughts in order on the Brainscan menu and then hold down the <Cursor-Right> key to page through the drawings quickly.

In addition, the attribute of each graphics character (or any other character, for that matter) can be changed. On a monochrome monitor, attributes in-

clude inverse video, intensity (boldface), underlining, and flash (blinking on and off). Attributes can be cleared or "painted" with another attribute. The current attribute of a character is shown on the top status line.

On a color monitor you can use all of these attributes along with red, green, and blue. By mixing the colors you can produce 16 colors for both the background and foreground.

If you don't want to use the block graphics on the <Alt> line, press <**Alt**>-**D** (for Define) to take you to a definition menu where you can select from the entire ASCII extended character set. For example, you can replace the block characters with foreign characters and accent marks.

Printing Thoughts

To print extended characters you'll probably have to go into the print menu (<F8>) and enter the printer definition screen (called Environment). Here, on a character translation table, you can tell a dot matrix printer to produce whatever graphics characters come closest to those *THOR* displays. (See "Translating Characters in THOR's Environment" for tips on converting characters.)

The print menu also provides an Include command that lets you set up a print queue, reorder thoughts, and include boilerplate text strings. The usual print options for double- or single-spacing, sequential page numbering, creating headers, and pausing between pages are all available, along with such extras as the ability to suppress the printing of remarks.

Where's the Documentation?

THOR provides an excellent, good-humored disk tutorial that shows you how to categorize the restaurants in New York City and helps you define a State of Mind in which you are looking for all French restaurants in midtown Manhattan that serve duck specialties.

However, the on-screen tutorial and on-line help features do not make up for the program's inadequate documentation. The program relies heavily on its extensive on-line help, but the information displayed should also be in the manual for reference; otherwise, it's hard to be sure that you've seen all of it. The help screen options keep shifting because of previous choices you've made, and sometimes a help screen you want to see is no longer listed as an option when you need it.

THOR's on-line help feature has one other problem. Although my reaction may simply be the fanaticism of someone who used to teach freshman composition, when help screens tell me about my *floopy* drive, ask *wheather* or not I want to do something, instruct me to enter one response *bellow* another, suggest that *currsor* keys serve certain *porposes,* and mention my disk *id* (instead of *ID*), I begin to wonder who really needs the help.

At first glance, *THOR*'s documentation seems refreshing, especially to the weary soul who is all too familiar with massive technical manuals. But while delightfully free of computer jargon, it is also at times disturbingly free of complete, detailed information. For instance, the limitation of thought size to 6000 characters on a 128K computer is not a problem as long as the first-time user understands how seriously to take the warning messages about running out of memory. If a thought is getting close to seven screen pages, a message will appear on the bottom of the screen: 'Only 2000 bytes of memory left'.

By making a series of drawings that change progressively for each new thought, you can create a simple cartoon.

The first time I used *THOR*, a number of other messages appeared but none told me to stop typing. That message was made quite clear when *THOR* tossed me out of the system, sending my last two pages into never-never land. After calling the manufacturer's 800 number, I was told that if you go beyond the 1000-byte (1K) limit, the part of the program that allows *THOR* to save your thought doesn't have room to operate in memory. The point, of course, is that even user-friendly messages and careful warnings about memory shortages are useless unless somewhere in the program or the manual their exact significance is explained.

Translating Characters in THOR's Environment

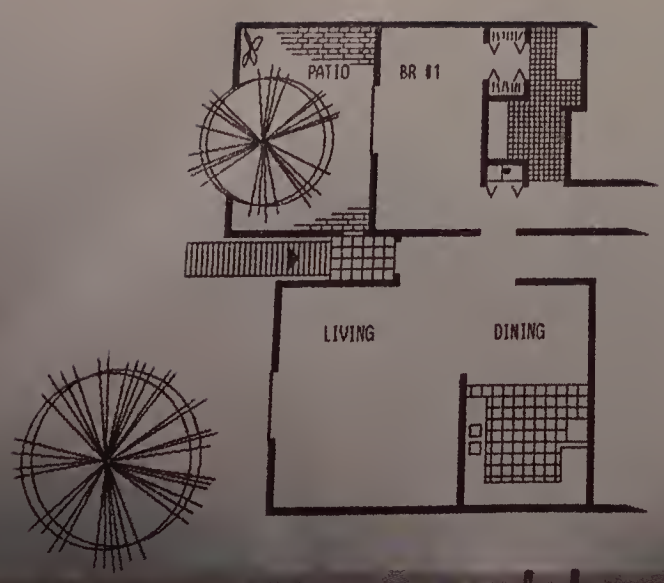
The character translation table for printing extended characters, listed on the Environment menu, is not documented very well on the help screens and not at all in the manual. Even when you remember to press <F10> for help, several leaps of logic are usually necessary to understand what's going on.

For example, the help screen tells you to scroll two columns of ASCII numbers with their associated characters until the character you're looking for appears. "Scrolling" is not an accurate description; the characters flash by like the rolling fruits on a slot machine. When you find the character you want to reassign, press <Enter>. This locks the character in place on the left side of the screen and sends the cursor to the right column. Once again you scroll the ASCII numbers with their associated characters and select the character you want sent to the printer in lieu of the character on the left. At least that's what the help screen tells you.

The problem is, your printer may translate ASCII codes altogether differently. What you need to do, I eventually discovered, is check the character style charts in your printer manual and select the ASCII code number that will print the character you want, disregarding whatever character is displayed next to it on the screen.

Once you get the hang of this character translation table, however, it provides great flexibility. I was able to reassign several shapes so I could create tight, clear, recognizable block letters and print them on my printer. The display on the screen did not match my printout exactly, but it was close enough for my purposes. By a process of trial and error that took me about 4 hours, I successfully defined printer commands to change the line height and change it back again and edited the character translation table.

The ability to incorporate simple graphics into a document creates some additional problems. You may need to issue some line height commands in the Environment section; the usual 1/6-inch line height leaves large gaps between vertical lines on many dot matrix printers, but a line height of 5/72 will eliminate this problem. Luckily, *THOR* allows you to embed additional commands to put your printer into 5/72 line height and take it out again so that text preceding and following your designs will look normal.



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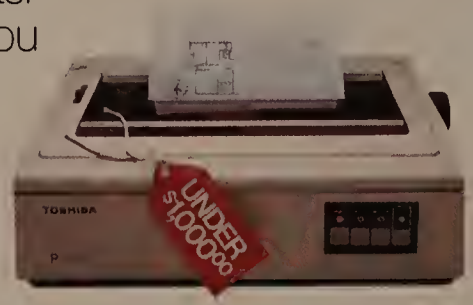

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In Touch with Tomorrow

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The program has some other nasty bugs, which kick you out of the system if you press the wrong key combination. I have tried unsuccessfully to recreate the chain of events that led to those incidents. Be aware that various odd key combinations may not have been disabled by the program and could get you into difficulties.

A Stay Against Chaos

Flexible enough to serve many purposes (and even a few *porposes*), *THOR* stands out in the crowd because of its smooth combination of data base and word processing capabilities, not because of either of those functions in isolation. It's an original program with many future enhancements planned. A user may be excited by the evolving greatness or puzzled by the unpredictability of a program that isn't quite finished yet. Of course, what good program ever is?

Like all significant software, *THOR* is an intellectual tool. We choose and shape our tools and in turn are shaped by them. *THOR*'s programmers understand the human tendency toward chaos and tried to create some meaningful order. My basic nature hasn't yet changed under *THOR*'s influence, but it may not be unreasonable for me to hope. After all, I keep discovering all sorts of capabilities in this program that the manual makes no mention of. Perhaps the "life organizer" has been hidden in *THOR*'s rabbit warren of help screens, and one day I'll remember to push the help key at just the right moment.

Elizabeth Wallace is the office automation consultant for Basically Computers of Westminster and Columbia, Maryland, and is the director of the KayPro Writing Project in the Baltimore County Public Schools.

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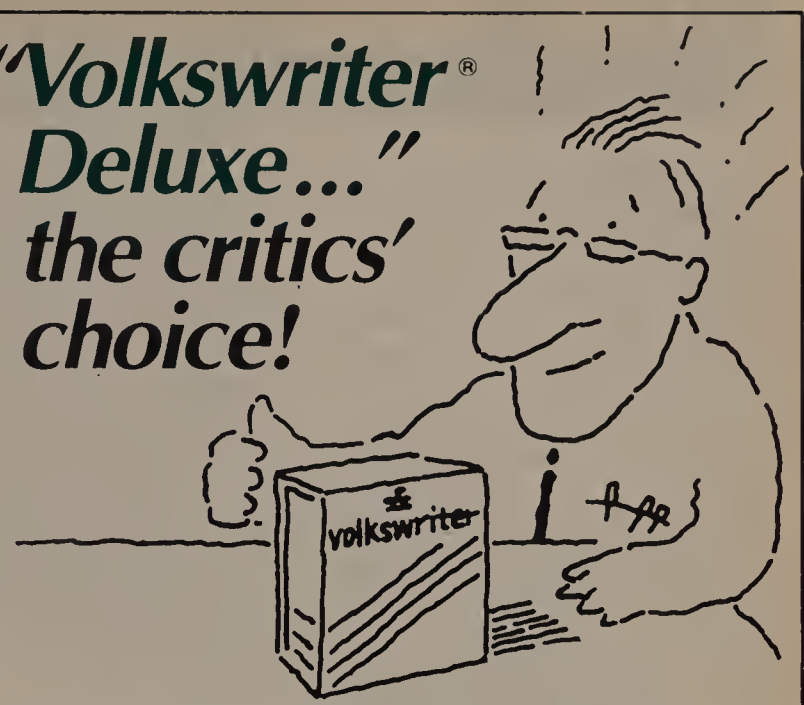

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Washington DC Capital PC User's Group Vol. 3, #4

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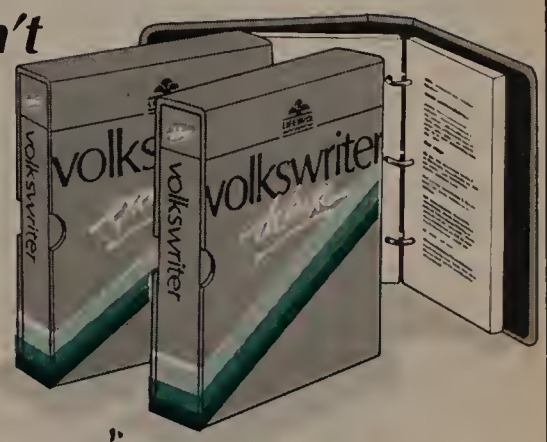

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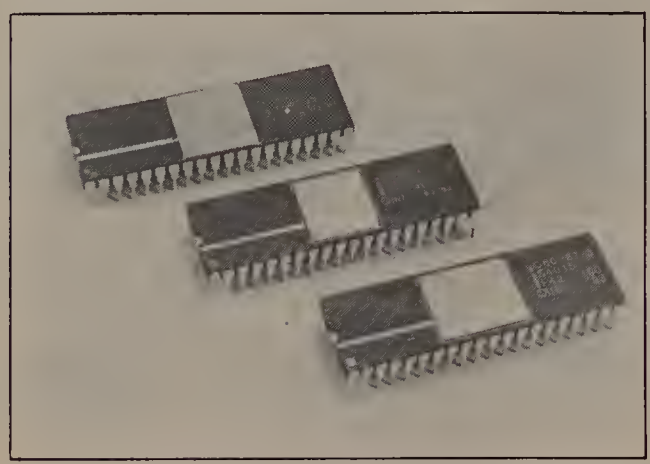

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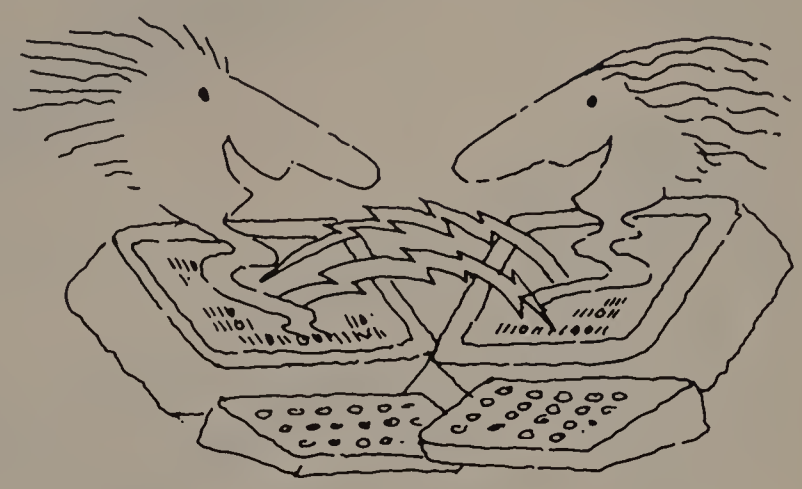

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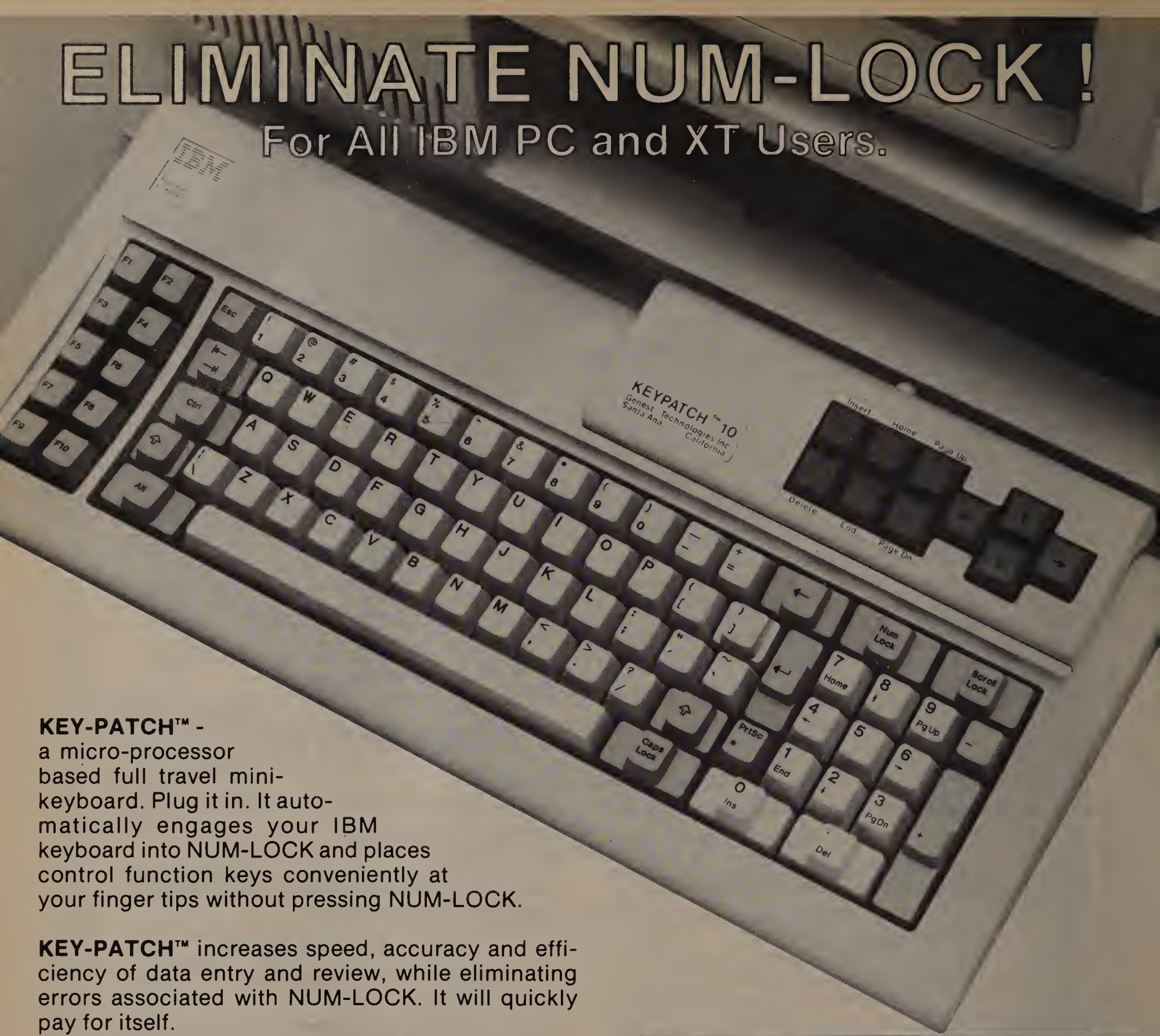

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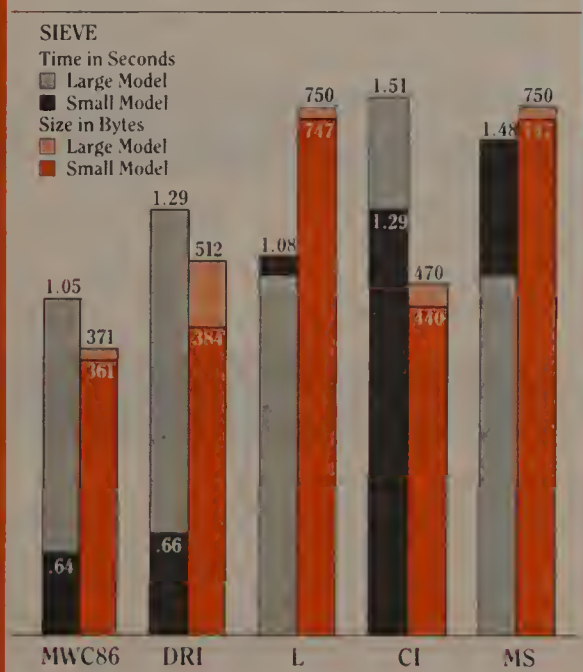

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WordMARC: An Office Powerhouse

WordMARC offers businesses all the specialized word processing features they need, including glossaries, stored formats, a merge function, and sophisticated statistical features. And all the functions are available from dedicated keys.

Merrily Shinyeda

MARC Software International, publisher of *WordMARC*, has been developing and supplying software for minicomputers and mainframes for 14 years. *WordMARC* is an adaptation for the IBM PC of a word processing program that the company developed in 1980 for larger computers. The PC version retains all the functions of the original product while taking advantage of the PC's keyboard and operating system.

WordMARC operates like a dedicated word processor—Wang users will recognize familiar commands and prompts. Choices are easily made from menus, and the program takes advantage of the function keys and the numeric keypad to mimic the function keys on a dedicated machine. *WordMARC*'s features are as extensive and as flexible as those found on most dedicated word processors (see Table 1 in "Word Processing '85" for a list of *WordMARC*'s features).

Starting Out

From *WordMARC*'s main menu you can edit an existing document, create a new one, check spelling, print, manage files, access glossary operations or the Auxiliary menu, or exit to DOS (see Figure 1). Although a language-change option is also listed, this option is not currently supported on the PC version. You can select an option by positioning the cursor on the desired function using the <Space> bar and pressing <GrayPlus>.

The Auxiliary menu controls various *WordMARC* functions, such as the method of hyphenation, display or suppression of menus, and the recovery and encryption of documents.

Selecting the Create option brings up the Create menu, which lists a number of document types. *WordMARC* comes with preset formats and printing options for standard business letters, memorandums, manuals, wide documents, and TWX messages. You can modify any preset format and add additional formats. *WordMARC* also has an option for storing documents in ASCII format so that *WordMARC*-created documents can be used with other programs.

Simple Editing

To edit a document, you select Edit from the main menu and type the name of a file. If you want to see the directory first, press <F2>. (You press the <F2>

Figure 1: WordMARC's main menu. After you make a choice, WordMARC guides you through the next stop with a prompt or another menu.

key whenever you want quick access to the directory.) If the directory is extensive, you can use a wild-card search to find a group of related files.

WordMARC relies on the function keys and the numeric keypad to perform editing operations (see Figure 2). Because *WordMARC*'s programmers avoided the complex key combinations required by many other feature-rich word processing packages, the program is relatively easy to use. The designers have assigned the most frequently used functions—move, copy, search, replace, underline, block indent, and save to disk—to the function keys. A <Shift> and function key combination is required for operations used less often, such as merges and spelling checks. Other functions are controlled by the numeric keypad, including subscripts and superscripts, decimal tabs, and glossaries.

WordMARC includes Quick-Skip Forward and Quick-Skip Reverse features to help you move through text quickly. The <PgDn> key activates the Forward feature. After you press <PgDn>, pressing the <Space> bar moves the cursor forward to the next space. Pressing <Enter> or <Tab> moves the cursor to the first carriage return or tab (the end of a paragraph or the beginning of the next one). If you type an alphanumeric character, the cursor jumps to the next occurrence of that character. Pressing <End> activates the Reverse feature, which moves the cursor backward through text to the last occurrence of the designated character. The Quick-Skip Forward and Reverse actions remain in effect until you use a cursor control key or activate an editing operation.

Pressing <Ins> temporarily erases the line the cursor is on. After you have made an insertion, pressing <GrayPlus> reinstates the "erased" text and reformats the rest of the paragraph. This insertion method prevents you from inadvertently typing over important information and eliminates the frustrating wait for character shifts common in most insert modes. But being unable to view the text that immediately follows the insertion until after the insertion is completed can be annoying.

Text deletions can be handled in two ways. The <Del> key deletes one character at a time. Pressing <F4> activates an Erase function for deleting larger blocks of text. When you press <F4>, 'ERASE what?' appears at the top of the screen. Moving the cursor from the beginning to the end of the text segment to be erased and pressing <GrayPlus> removes the information from the screen and reformats the rest of the paragraph. Using *WordMARC*'s Quick-Skip Forward and Reverse with the Erase function makes it easy to mark large blocks of text for deletion.

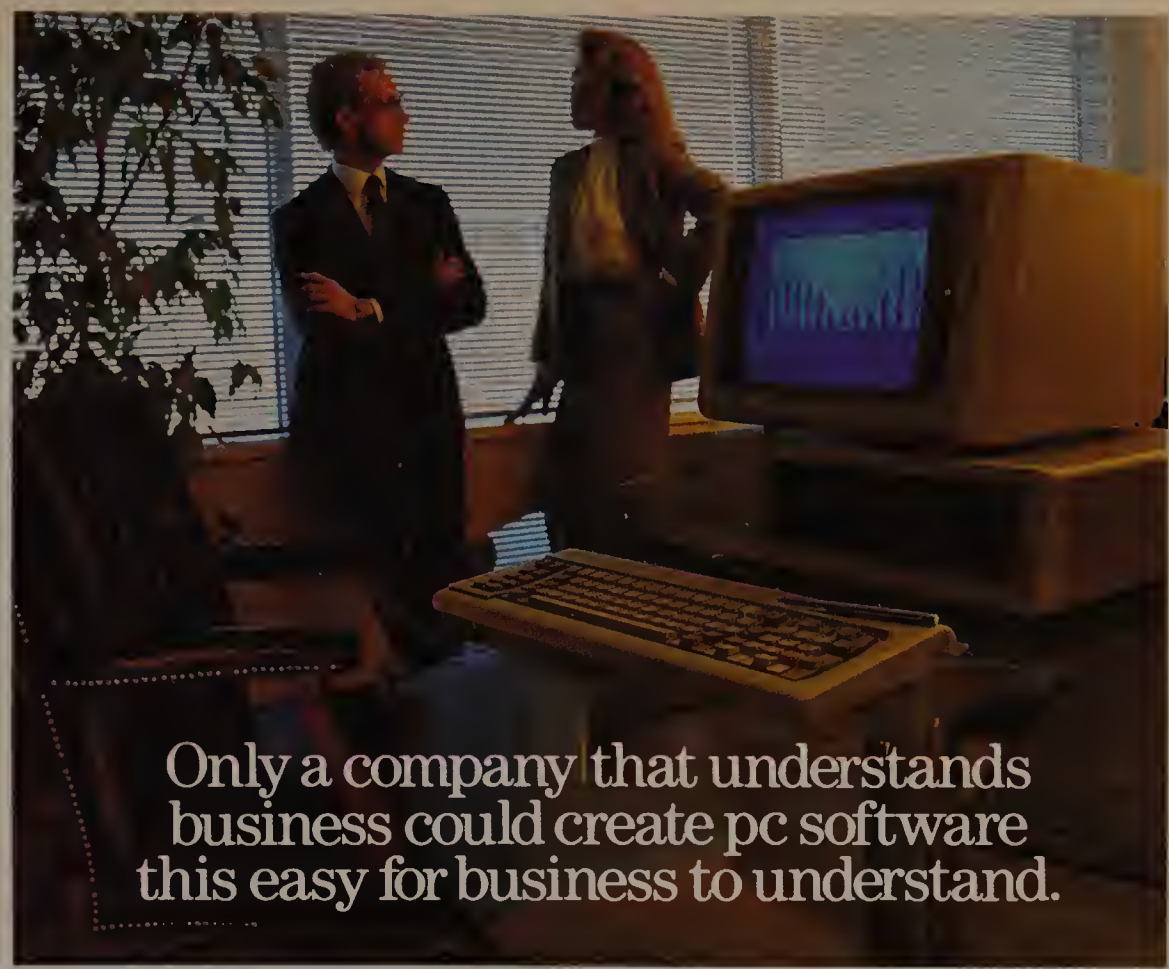
The <F2> key can be used with the search and replace function to replace selected text with material from a separate document.

Blocks of text can also be easily copied or moved with the <F7> and <F8> keys. You can copy or move a block of text to a new file by pressing <F2> (in response to the prompt 'MOVE to where?' or 'COPY to where?') and assigning the text segment a file name. You can store frequently used text segments, such as signature blocks, legal descriptions, and standard terms, as separate documents and write them into any document by pressing <F8>, pressing <F2>, and then typing the file name in response to the prompt 'COPY what?'. The <F2> key can also be used with the search and replace function to replace selected text with material from a separate document.

Document Formats

WordMARC formats are easy to create and save, and there is no limit to the number of format changes you can make in a document. Pressing <ScrollLock> inserts a new format line at the cursor position and activates Format mode, in which you can set new tabs; change margins, line spacing, and page length; and create headers and footers. Format lines can be copied within a document or stored as separate documents to be inserted when needed.

Headers and footers are easy to create and edit. By following the prompts displayed at the top of the screen, you can create a header or footer of unlimited length. You can insert a code in headers and footers to number pages automatically, but the program has no provision for alternate page numbering.



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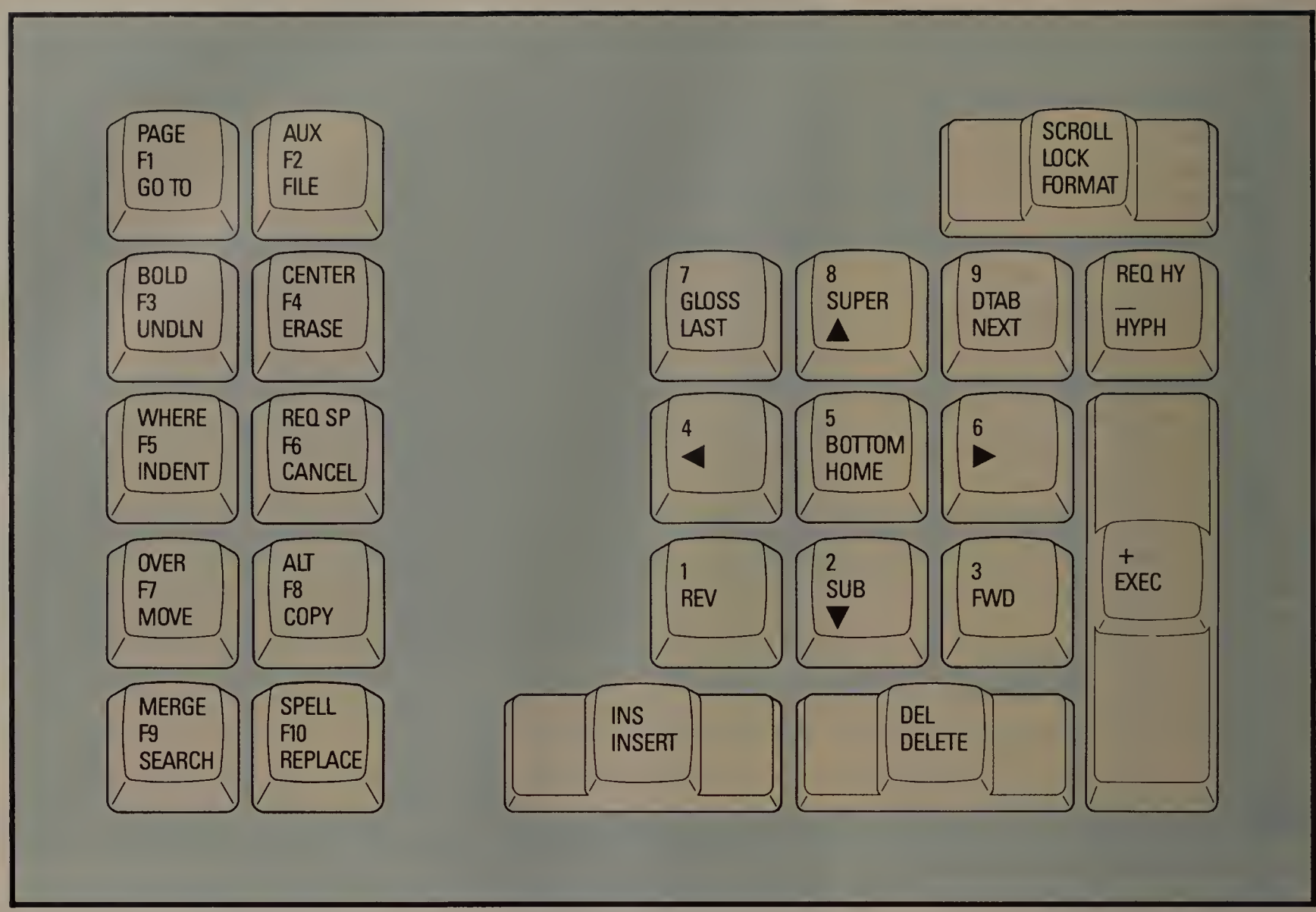

Figure 2: All of WordMARC's editing functions are activated with the function keys and the numeric keypad.

The Print Review option in the main menu lets you preview a document on screen to see how it will look on paper. The document is displayed with headers and footers, variable line spacing, right-margin justification, and merged text. Carriage returns, tabs, and other screen symbols are not shown.

Statistical Documents

WordMARC offers features that will be appreciated by those who frequently type statistical documents. Its decimal tab feature automatically aligns columns of numbers containing decimal points, and columns of numbers or text can be moved, copied, or erased using *WordMARC*'s column operations. To erase a column, press <F4> (Erase) twice to inform the system that the text to be erased is a column rather than straight text. Moving or copying columns of numbers and text works the same way; you press <F7> (Move) twice to move a column or <F8> (Copy) twice to copy a column. Prompts guide you through column operations.

Most word processing programs display subscripts and superscripts surrounded by codes. When formulas and equations are created using *WordMARC*, however, they appear on the screen much as they will look on paper; the only difference is that superscripts and subscripts are displayed a full line above or below the home line but print offset by half a line. Six superscript and six subscript levels are available for scientific and mathematical formulas; 13 levels can be displayed on the screen. Because the code-

WordMARC *offers features that will be appreciated by those who frequently type statistical documents.*

less formula can be proofread easily on screen, hard-copy errors can often be avoided.

If you purchase a $100 alternate-character EPROM containing the general scientific character set, *WordMARC* can display Greek and scientific characters on the screen. MARC Software says that Greek and scientific character generation will be included at no additional cost in the next release of *WordMARC*.

Added Attractions

In many word processing packages, the coding required to set up mail merge documents is so complex that most users do not take advantage of this powerful feature. By eliminating the frequently required end-of-item and end-of-group delimiters, *WordMARC* makes mail merge operations easy to remember and perform. You just type <Shift>-<F9> at each location where variable information is to be inserted in the primary document. The same key combination separates each variable in the secondary document. During printing the variables combine automatically with the standard document, producing custom form letters and documents.

Another powerful *WordMARC* capability is its glossary feature, which lets you store frequently used words and phrases, format lines, and even some *WordMARC* functions. You can easily recall them by typing <Shift>-<Home> and an identifying abbreviation. The glossary feature can also enhance the search and replace function to accomplish tasks not usually possible with

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that operation. For example, text that is underlined, contains superscript or subscript characters, or exceeds 80 characters cannot generally be entered as replacement text, but it can be stored as a glossary and inserted as replacement text.

WordMARC includes a spelling checker with a 57,000-word dictionary to which you can add your own words. The spelling checker offers the basic options, such as ignoring a flagged word, replacing it, or adding it to the dictionary. But it also offers the unusual option of creating separate "document dictionaries" for specialized documents that need to be checked several times.

Learning WordMARC

An array of features as impressive as *WordMARC*'s can be intimidating to first-time users, and *WordMARC*'s manual doesn't help much. The program comes with five disks—an install disk, a program disk, a utilities disk, and two spelling disks. The manual contains 52 pages of installation instructions and function-key definition options. It is almost devoid of graphics and is crammed with enough information to test the tenacity of even the most dedicated personal computer enthusiast. An extensive tutorial section is included.

To make things more confusing, the *WordMARC* manual was not written specifically for the IBM PC. It was designed as a universal manual to be used with the Eagle PC and the Eagle 1600, the NCR PC, the DEC Rainbow, and the TI

Professional. Instructions for performing functions are generic; keys for carrying out each function on specific microcomputers are shown on a small reference card that comes with the manual. Misplacing the reference card renders the manual almost useless. The manual does not refer to the PC function keys, and no on-line help is available.

WordMARC is otherwise an exceptionally friendly program. It takes full advantage of the PC keyboard and presents understandable prompts and concise menus. With a PC-specific manual, this package could become one of the premium business word processing packages on the market. In the meantime those stalwart individuals who invest the time it takes to master *WordMARC* will discover an extraordinary word processor.

Merrily Shinyeda is an office automation consultant in Tempe, Arizona.

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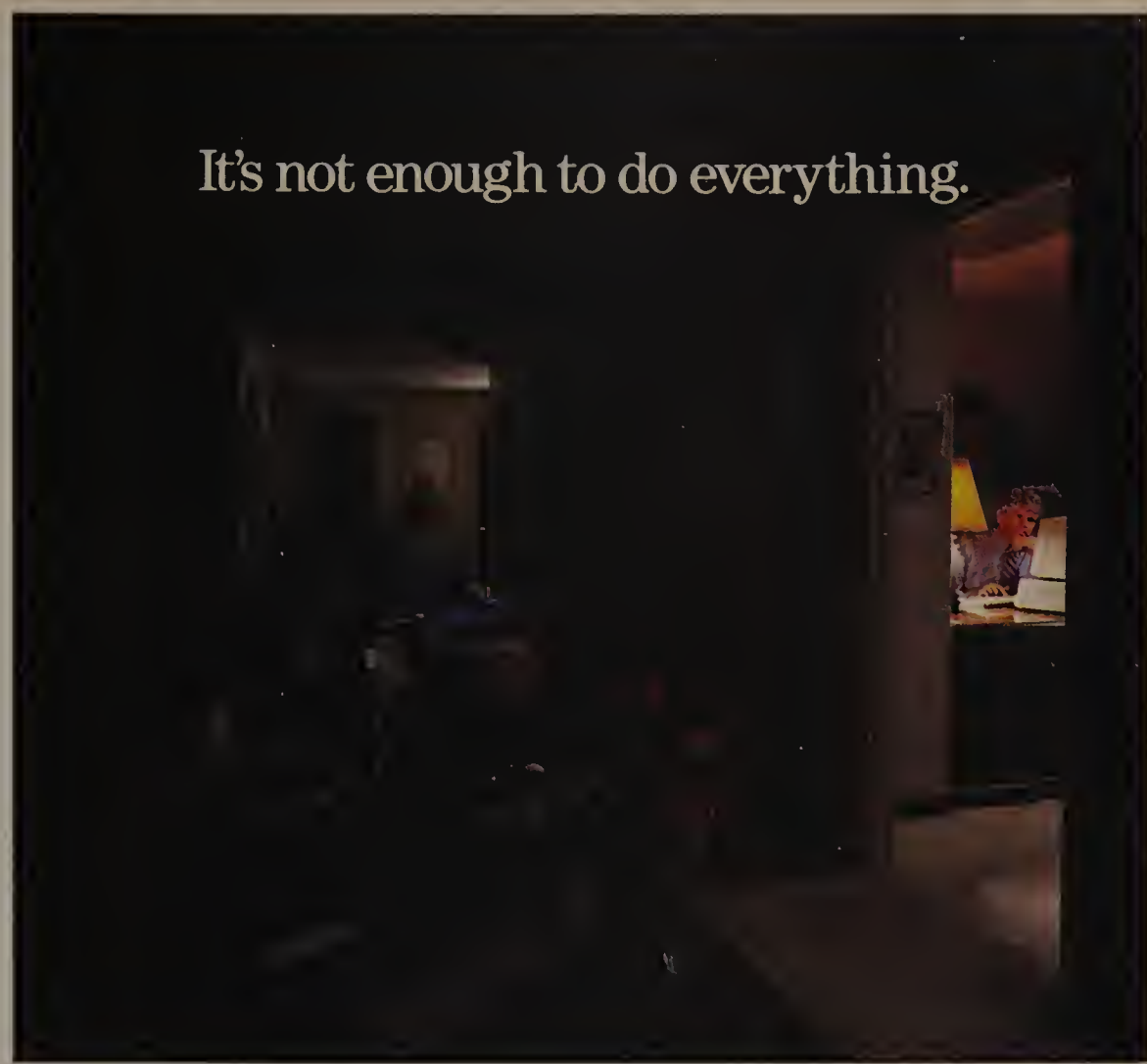

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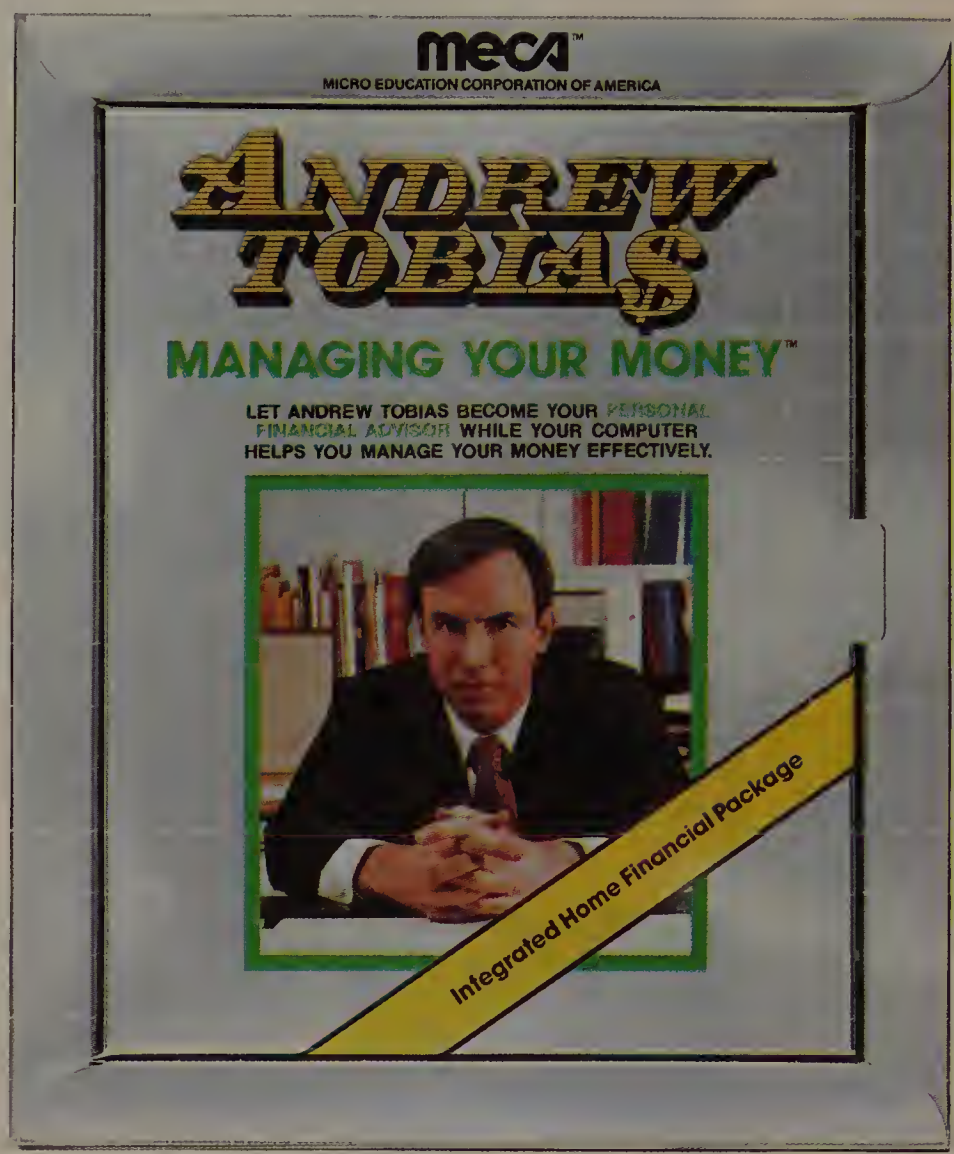

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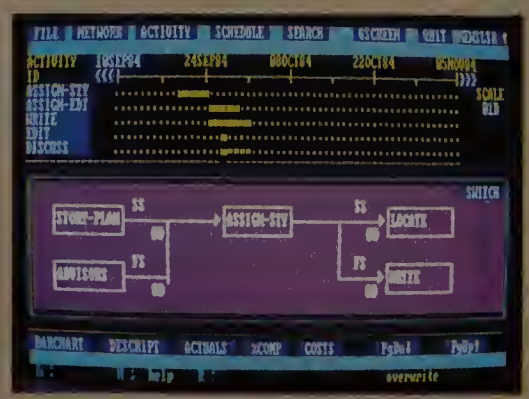

A picture of the project plan.

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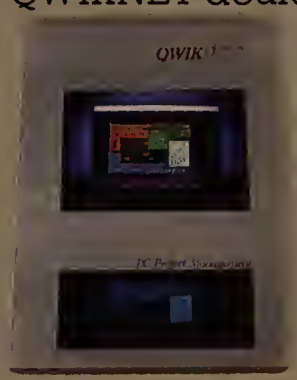

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DisplayWrite 2: In the Corporate Mold

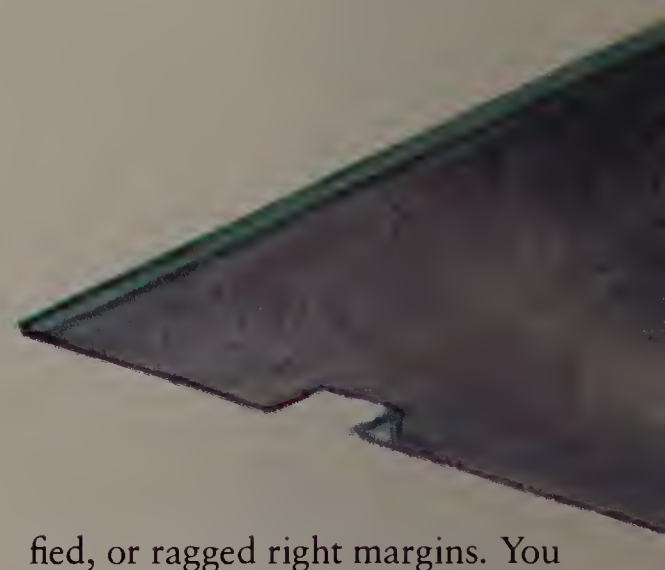
IBM brings PC word processing under its umbrella with DisplayWrite 2. The program mimics the company's DisplayWriter dedicated word processor, adding another link to the IBM office system.

David D. Beckman

IBM's DisplayWriter has been a best-seller in the dedicated word processing market since 1980. The IBM name and support team, while advantages, are not the machine's only strong points; extensive menus and numerous editing functions have also contributed to its popularity. But these days offices are depending less on dedicated word processors and more on the cost-effective and versatile PC. In response to that trend, IBM has announced *DisplayWrite 2*, which imitates the DisplayWriter's Textpack 4 software.

DisplayWrite 2 retains most of the functions and screen displays of IBM's dedicated word processor. The menus and commands will be familiar to anyone who has used the DisplayWriter, and those who are new to IBM word processing will appreciate how easy the program is to use.

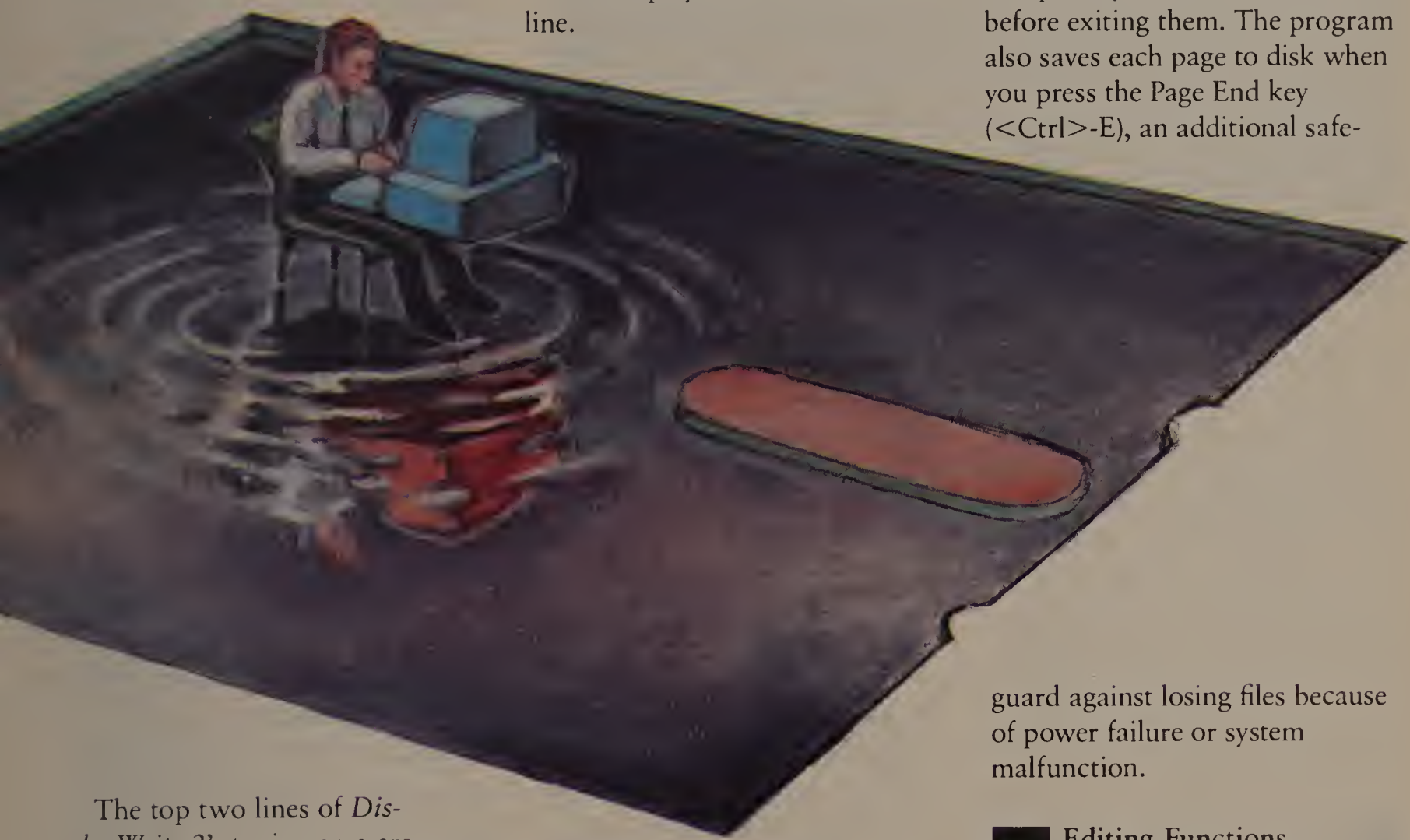
You can customize *DisplayWrite 2* using the Change Text Defaults menus, which let you define standard format defaults. Once you set the values, every document you create will conform to them. Standard defaults can be set for margin width, number of lines per page, type style, line spacing, hyphenation zone width, and tab settings (including decimal, comma, centered, and flush right). You can adjust the automatic pagination feature to break pages at an exact line or to prevent page breaks that leave a stray line of a paragraph on another page (widow and orphan control), and you can choose justified, half-justified, or ragged right margins. You can set up alternate default settings for frequently used formats, such as wide charts (see Table 1 in "Word Processing '85" for a full list of *DisplayWrite 2*'s features).



Ready to Edit

DisplayWrite 2 uses an extensive series of menus to guide you through each operation. Functions often have three or four menus each. The menus are presented logically and make the program easy to learn, but veteran DisplayWriter users might miss Textpack 4's menu-bypass feature, which lets experienced users bypass the menus with a single com-

mand—one of the few Textpack 4 features not provided in *DisplayWrite 2*. But because most menu choices are filled out with previously defined default values, the menus remain fairly unobtrusive; when no changes to the defaults are required, you can quickly continue by pressing <Enter>.



The top two lines of *DisplayWrite 2*'s typing area are status lines, which display the current document name, page number, line number, and whether the program is in insert or replace mode. The third line is a scale showing margin and tab settings. The bottom line is reserved for the same helpful prompts and messages that have contributed to the DisplayWriter's popularity.

The screen displays text as it will be printed, except for underlining, boldface, and justification. Underlined words are displayed in yellow on a color monitor and highlighted on a monochrome monitor. Unless you opt to see them at all times, the codes designating carriage returns, page ends, tabs, boldface, and other format instructions are displayed only when the cursor is on the code. At the same time, a description of the code is displayed on the status line.

When you create or revise a document, you can change its format from the default settings. You can also change formats in the middle of a document by pressing the Format Change key (<F7>). Depending on the position of the cursor, some format options may not be available. For example, you can change the number of lines per page at the beginning of a page but not in the middle. The menus shown when you press <F7> list only the changes that can be made at that cursor position.

Whenever you need a file name, you can press <F2> to access a directory that lists the name of each document, the disk space used by each, and the percentage of disk space remaining. You can open a document while viewing the directory, a handy feature that Textpack 4 does not have.

Like Textpack 4, *DisplayWrite 2* requires you to save files to disk before exiting them. The program also saves each page to disk when you press the Page End key (<Ctrl>-E), an additional safeguard against losing files because of power failure or system malfunction.

Editing Functions

Since the PC lacks the dedicated move, copy, and delete keys of the DisplayWriter, these functions are approached through the Block key <F4>. Pressing this key brings up "prompt-line choices" instead of *DisplayWrite 2*'s usual full-page menus. These operations are easy to learn, quick, and not likely to be enacted accidentally.

Similarly, the Command key (<F6>) and the Instruction key (<F8>) use prompt-line choices to offer additional editing func-

tions, including a four-function math feature that lets you calculate rows or columns of figures. Pressing <Shift>-<F4> gives you access to the column functions, which automatically set up columns and enable you to move, delete, or copy text or numerical columns without affecting text to the left or the right.

The Search and Replace menu lets you search for and replace up to three character strings at once, in either prompted or automatic mode. You can make exact character or word searches. Choosing the word option ensures that a search for the string *in*, for instance, will find those letters only where they appear as a separate word and not within a word, such as in *think*.

Those accustomed to the DisplayWriter will immediately notice that *DisplayWrite* 2's cursor is much less agile. It cannot move by word or sentence, unlike the dedicated machine's cursor; it moves one character at a time with the cursor movement keys. Its only other jumps are to the beginning or the end of a line or a page.

Assembling Documents

Those familiar with Textpack 4 will be pleased to know that *DisplayWrite* 2 has the Get function. This feature allows you to bring all or part of another document into the one you are working on and can be used to assemble boilerplate documents from a library of standard paragraphs.

The Get function can also bring text and spreadsheets from documents created by other applications into *DisplayWrite* 2 documents, provided that the text is in printable ASCII format. When you invoke the Get function, the program first checks whether the requested text is in *DisplayWrite* 2 format; if it is not, the program automatically converts the text from ASCII format and brings it into the current document. Characters not recognized by *DisplayWrite* 2 appear as miscellaneous symbols that must be edited manually.

Powerful mail merge and "include" features can also be used to assemble boilerplate documents. To use merge, you assign a unique name to each variable and embed the names in the standard "shell" document. You then set up "fill-in" documents, which indicate the variable information by name. This technique allows you to use the variable information in any order and as many times as you need it; the program will find each variable name and match it with the corresponding data. Several sets of variables can be stored in each fill-in document. To merge the documents, you load Merge Tasks from the main menu and specify which documents you want to use.

The Include instruction can be used with the merge function to assemble standard paragraphs from a library and insert variable information into them in one procedure.

Spelling, Printing, and Other Tasks

DisplayWrite 2 is divided into nine tasks (see Figure 1). When you switch tasks—for example, when you move from Revise Document to Print Document or Spelling Tasks—the program lags as it reads the code from a system disk. Otherwise, the program works quickly.

The tasks are apportioned to three system disks, a configuration that requires some disk shuffling. To minimize this annoyance, IBM has put the tasks used most often on the second system disk. You can create or revise a document, paginate it, and print it without changing disks. The Merge Tasks and the Document Utilities task are also included on the second system disk. The third disk contains Spelling Tasks, and the first disk contains the Change Text Defaults menus. Because the program is always loaded from the first disk, to create or revise a document you have to insert the first disk and then switch to the second disk to load the Revise Document task. If you use the program in a hard disk system, you will not have this problem, but if you have floppy drives, it's annoying.

The Document Utilities task lets you rename, delete, recover, and compress documents (for a higher

The column functions automatically set up columns and enable you to move, delete, or copy text or numerical columns without affecting text to the left or the right.

storage ratio). The Change Work Station Profile task provides menus for informing the program of your work station terminal and printer type. The *DisplayWrite 2* manual defines only four types of printers that the program supports–three IBM printers, the NEC 3550, and "compatible printers." The manual says, "It is the responsibility of the customer to determine printer compatibility."

Choosing Spelling tasks calls *DisplayWrite 2*'s 100,000-word dictionary into action. The spelling checker operates in either automatic or prompted mode. The program lets you create an unlimited number of supplemental dictionaries, but you cannot add words during the spell-check process. The program does not suggest correct spellings for words not found in its dictionaries. A legal dictionary, *DisplayWrite Legal Support*, can be purchased separately.

The Print Document utility enables you to set up and reorganize a print queue and choose how many copies and which pages of each document you want printed. Although *DisplayWrite 2* includes a print spooler, editing and printing speeds decline appreciably when you are printing as a background function.

The documentation for *DisplayWrite 2* is written for secretaries and emphasizes professional documents. DisplayWriter users will seldom need to refer to the manuals. And the helpful menus, prompts, and keyboard template make the learning easy for newcomers.

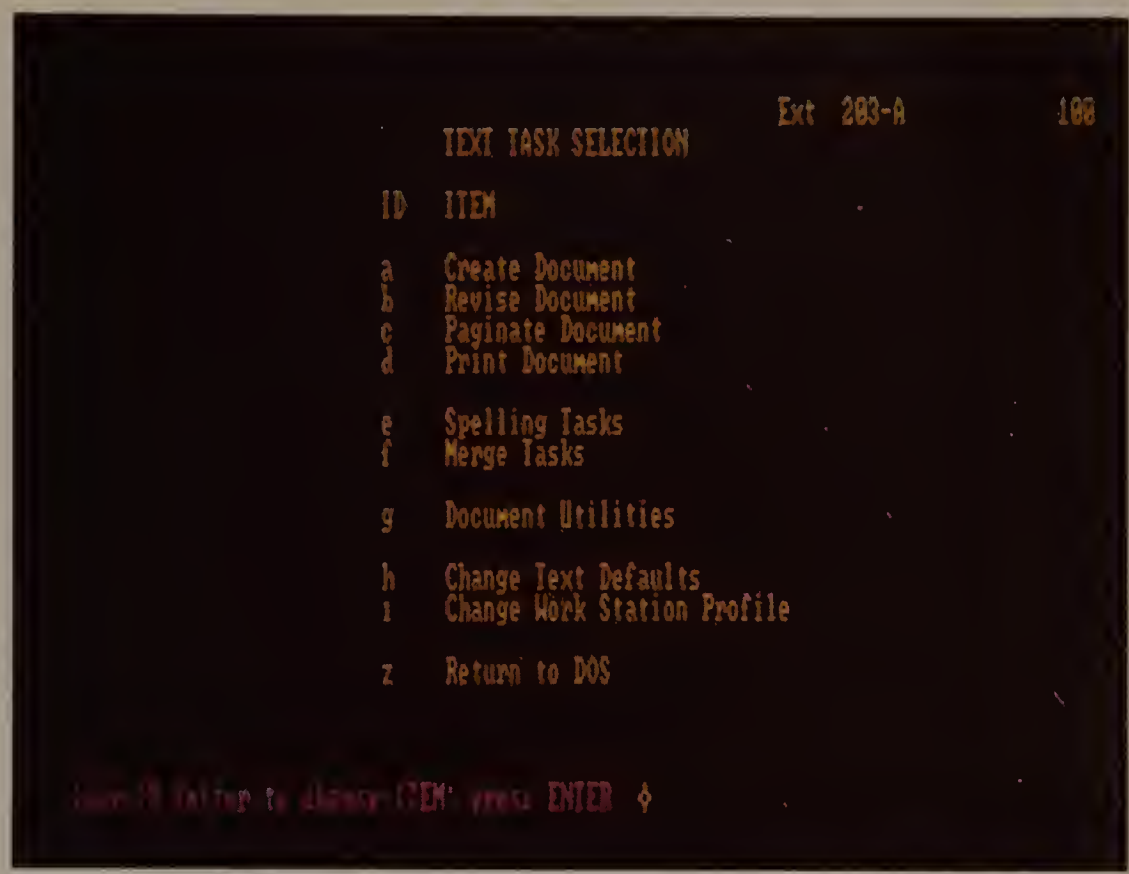


Figure 1: DisplayWrite 2's main menu lists the program's tasks. Each task includes a series of backup menus to guide you through each procedure.

Because the menus are laid out logically and the prompts and error messages are so clear, the lack of a help function is not a major problem. Support is provided only by the dealers; no direct number to IBM is offered.

The IBM Connection

DisplayWrite 2 is a clear choice for offices that have used and appreciated the DisplayWriter–especially those that have both DisplayWriters and PCs. IBM has also introduced two other products to bridge the gap between the DisplayWriter and the PC. *DisplayComm BSC* is a bisynchronous communications package designed to telecommunicate *DisplayWrite 2* files among PCs, IBM mainframes, and DisplayWriters. The DisplayWriter/Personal Computer Attachment lets you transfer files between a DisplayWriter and a PC. The attachment can also link a DisplayWriter to a PC Cluster, IBM's simplest local area network.

The differences between the keyboards of the PC and the DisplayWriter (whose keyboard resembles an IBM Selectric typewriter) and the repositioning of some functions may present problems for those who regularly switch between the PC and the DisplayWriter, but the similarities between Textpack 4 and *DisplayWrite 2* outweigh the differences.

Those who haven't used the DisplayWriter will find that *DisplayWrite 2* can compete with the best business word processors available for the PC–and it costs less. Its menus and easy customization set the program apart from

DisplayWrite 1

Along with *DisplayWrite 2*, IBM has released a junior partner, *DisplayWrite 1*. The program is designed to run on the PCjr—its functions are scaled down to fit the PCjr's smaller memory (it requires only 128K of RAM). The idea is that office workers can take a disk home and revise business documents on home computers equipped with *DisplayWrite 1*. The program includes a utility that converts documents between *DisplayWrite 1* and *DisplayWrite 2* formats.

DisplayWrite 1 is not limited to the PCjr, however. The program offers a full complement of word processing functions (including block move, copy, delete, and search and replace) and format features (including justification, headers and footers, underlining, and boldface). But it lacks the office-oriented features of *DisplayWrite 2*, such as column, merge, and math functions.

DisplayWrite 1 has a couple of features of its own. Its most impressive addition is Cursor Draw, which lets you draw vertical and horizontal lines to create boxes or bar charts that can be filled with four different graphics patterns. The patterns don't fit perfectly inside the lines drawn by the program, but the ability to create charts of any kind in a text document is rare and useful. *DisplayWrite 1* also includes on-screen help (albeit rudimentary help), a feature that is missing in *DisplayWrite 2*.

Editing functions are positioned on the keyboard in the same way as *DisplayWrite 2*'s, but the menus appear mostly on the prompt line—a structure some users may prefer. *DisplayWrite 2* is in a way handicapped by its fidelity to the DisplayWriter. *DisplayWrite 1* uses an easier method of option selection; you choose options with the cursor and the <Enter> key instead of selecting them by item letter. And *DisplayWrite 1* has more flexible save operations, allowing you to exit a file without saving it to disk.

DisplayWrite 1 has the same severe limitation as most other inexpensive word processing programs—document length is limited to about ten pages. But for the home, this $95 scaled-down version of a dedicated word processor is a well-designed bargain.

the competition, and its lineage ensures that it will be taken seriously in the business word processing market.

David D. Beckman is an attorney and CPA in Burlington, Iowa, and a consultant in medical and legal systems for minicomputers and microcomputers.

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GeoGraphics

Computer maps can be used to track demographic information and develop sales territories. Three colorful mapping programs—Atlas, DIDS JR, and Statmap—put geographic data into perspective.

Richard W. Orloff

The 1984 presidential campaign will go down in history as the first to include personal computers throughout the political process. Mapping programs were among the most common types of software to hit the 1984 campaign trail. With these programs candidates could target political strengths and weaknesses by region and quickly spot areas that required more advertising or direct campaigning (see "The New Political Machine," *PCW*, Vol. 2, No. 9).

A mapping program is a useful analysis and presentation tool for converting data into colorful graphics that reveal geographic relationships. By matching a number of statistical data files with a variety of boundary maps, users can analyze data from many geographic perspectives.

Politics is only one of many possible applications for mapping software. Mapping programs are used by market research companies to analyze demographics and market penetration; educators to teach geography; shipping companies to define truck delivery routes; police to locate centers of accidents and crime; and banks to select sites for new branches. In fact, any business that handles some of its market research in-house could take advantage of a mapping program.

Computer mapping software was once available only for mainframes. Now three programs that perform statistical mapping are available for the PC: *Atlas* from Strategic Locations Planning, *DIDS JR (Desktop Information Display System)* from Sammamish Data Systems, and *Statmap* from Ganesa Group International. (See Table 1 for a comparison of features.)

How the PC Draws Maps

To draw a map, the mapping program reads a boundary file of *X-Y* latitude-longitude coordinates and draws the map boundary. The program then reads a user-selected data file that matches a particular map with statistical information. Next it fills the boundary with colors or shading (hatching) that corresponds to ranges of data in the data file (see Figure 1).

Boundary files are available for every state, ADI (area of dominant influence), SMSA (standard metropolitan statistical area), county, municipality, census tract, and zip code. Special areas, such as truck routes, broadcast zones, and sales territories, are also available.

Statmap includes boundary files for the 50 states of America and all 3123 counties. *Atlas* and *DIDS JR* include only state files. Additional files can be purchased from

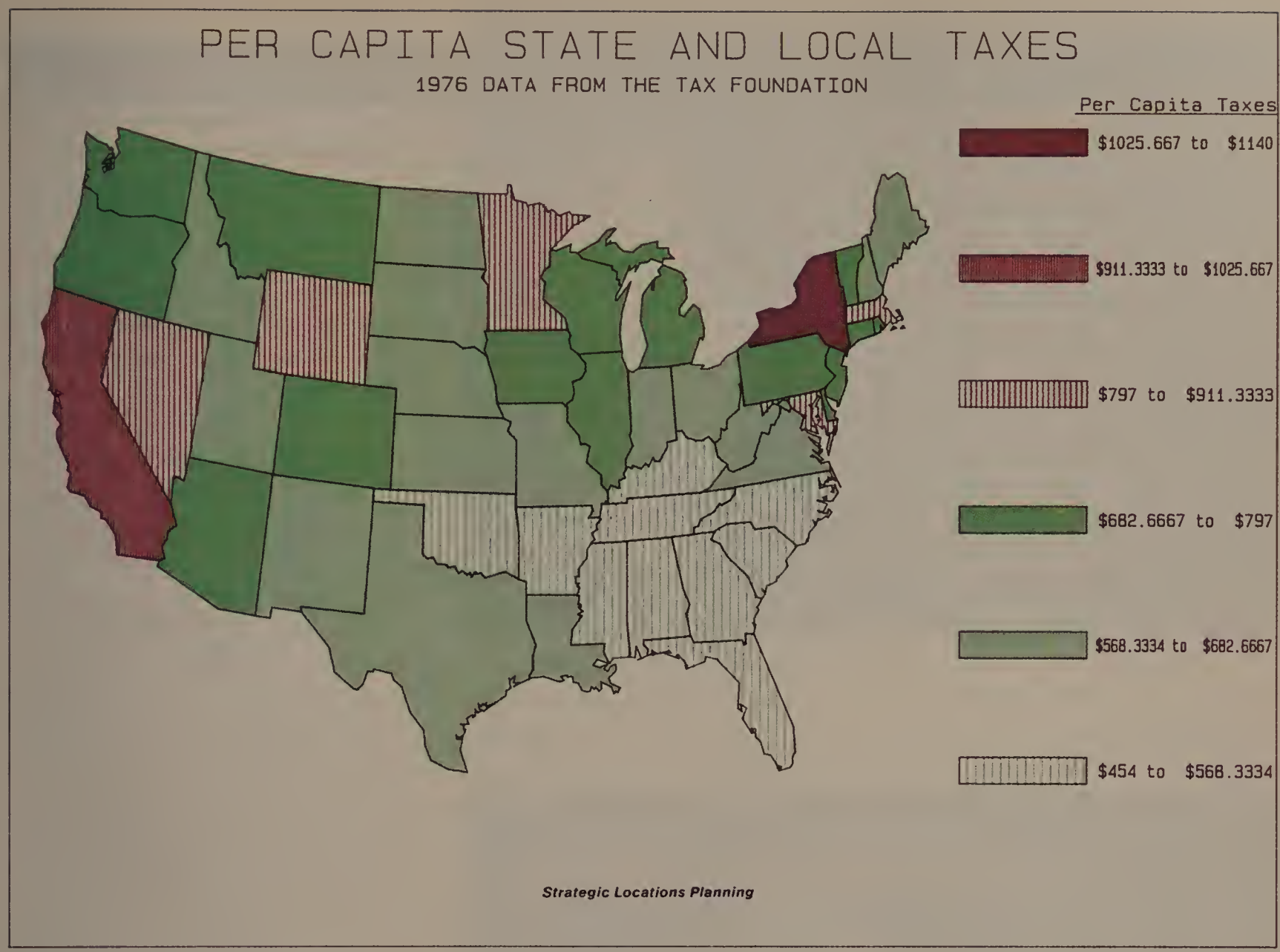

Figure 1: A map of the United States created with Atlas. Various shades of color and hatching are used to differentiate the data ranges shown on the right.

the manufacturers or third-party vendors such as Geographic Data Technology of Lyme, New Hampshire; Rand McNally of Chicago, Illinois; and Geographic Systems of Andover, Massachusetts.

Atlas users can create a list of boundary files that can be called and viewed within the program. *Statmap* presents a menu of the 50 states, and the user selects the ones to be viewed. For other areas, the program prompts the user for the boundary file name. *DIDS JR* lacks any organization of boundary files. You must know the name of the file and type it from memory.

All three programs read data files created with commercial spreadsheet and data base programs such as *1-2-3*, *dBASE II*, and *VisiCalc*. The files must include geographic codes and the data to be mapped, such as population or newspaper circulation.

Statmap users can create data files internally without having to use another program. The program displays a geographic identifier for the area to be mapped, and the user types in the data directly. Both *Atlas* and *DIDS JR* include a utility that creates data files, but users must perform this task outside the program.

The Elements of Mapping

A typical session with a mapping program begins when you call up a boundary file, either from a menu or with a command. The program then asks for the data file to overlay the map. When you have chosen both boundary and data files, you are prompted for labels, colors, and titles. The merged files then create a map that appears on the screen. The map image can then be either saved to disk for further analysis or sent to a plotter or a color printer.

Table 1: Mapping program features compared

Feature	Atlas	DIDS JR	Statmap
Plotters reported compatible by manufacturer	HP 7470A HP 7475A Amdek IBM Houston Instrument	HP 7470A HP 7475A Amdek Sweet-P Bausch & Lomb	HP 7221T HP 7221C HP 7470A HP 7475A B & L HI DMP 29 IBM XY 749 IBM XY 750 Calcomp-Sanders M84
Printers tested	IBM	IBM DataProducts Envision 430	IBM Epson Envision 430 IBS Prism
Graphics boards	ColorPlus IBM Tecmar Quadram Persyst	ColorPlus Everex	ColorPlus IBM Tecmar Conographics Amdek Paradise
Boundary files	Yes	Yes	Yes
Data files	Yes	Yes	Yes
Colors	4 or 16	16	4 or 16
Data ranges	20	6	10
Image save	BSAVE	Algorithm	Both
Change maximum/minimum	Yes	No	Yes
Colors/hatching	Both	Solid	Both
Titles	2	2	3
Color key	Yes	Yes	Yes
Plots per page	Unlimited	1	1 to 4
Boundary labels	Yes	Yes	Yes
Zoom	Unlimited	2X, 4X	Unlimited
Edit boundary files	Yes	No	Yes

A mapping program enables users to specify minimum and maximum values, number of data ranges, colors and hatching patterns, titles, magnification, and method of image processing. It should be fast and make some attempt to organize data.

Setting low and high values in a data range can make a map easier to understand. If the number of new customers by county is between 47 and 191, for example, you may want to change the minimum to 0 and the maximum to 200 to make the map legends easier to interpret. *Atlas* and *Statmap* allow users to set any minimum and maximum values.

A mapping program should let you specify how many groups of data are needed to tell the story. Sometimes data must be spread over several ranges to make differences among geographic areas obvious; at other times two or three ranges in the legend will suffice. *Atlas* can create 20 ranges, *Statmap* 10, and *DIDS JR* 6.

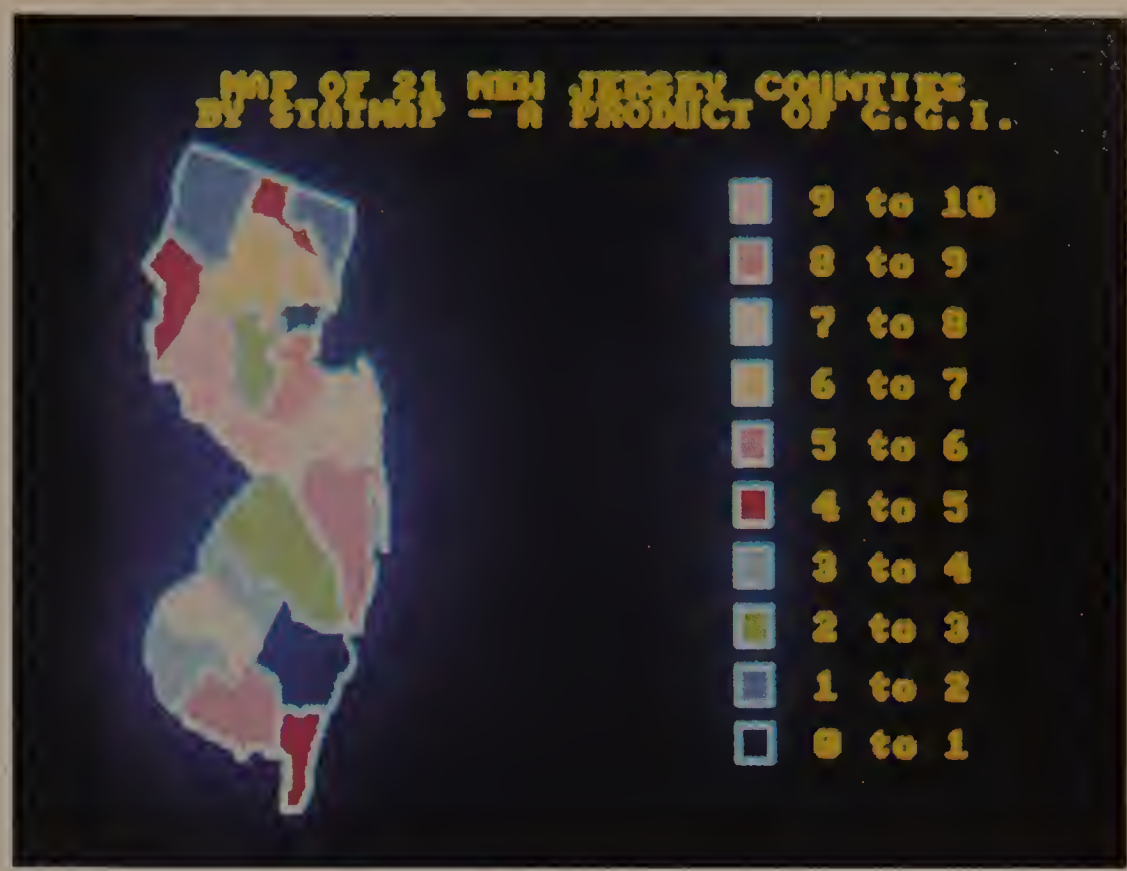

Figure 2: A map of New Jersey drawn with Statmap in 54 seconds

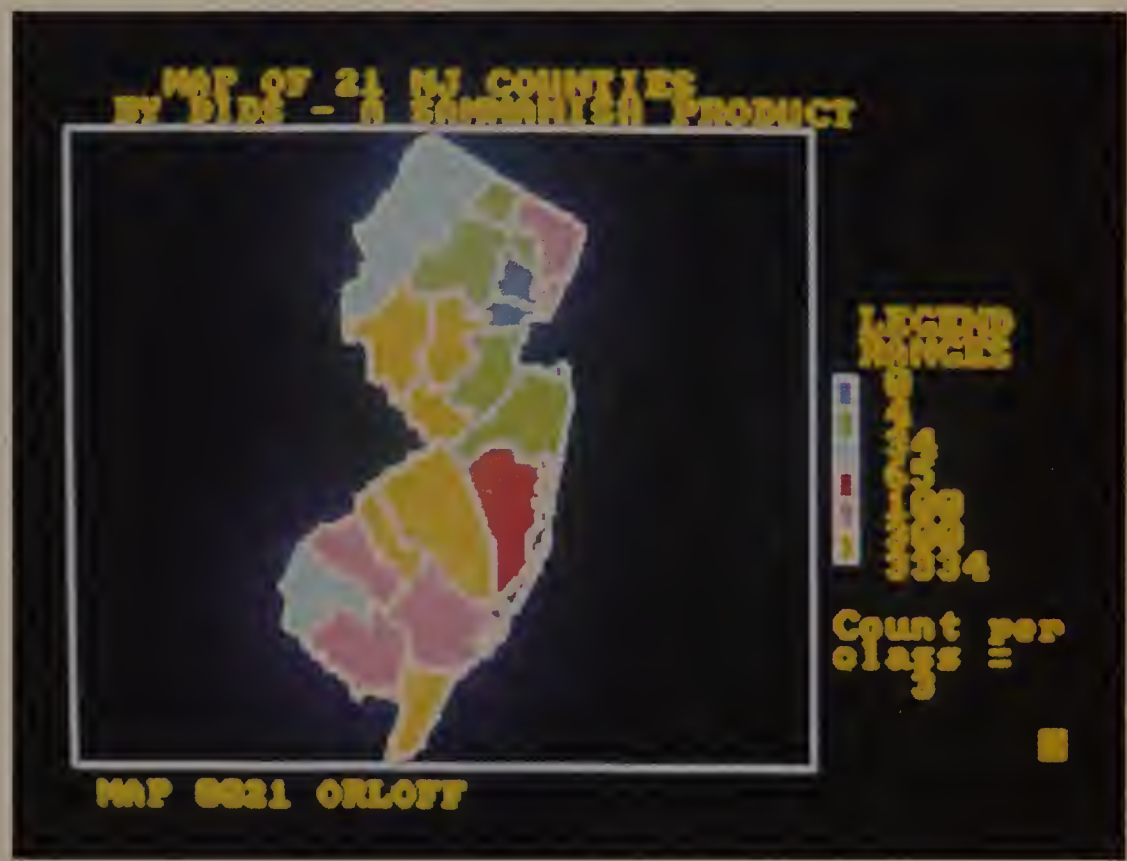

Figure 3: A map of New Jersey drawn with DIDS JR in 104 seconds

Colors and Hatching

Colors and hatching identify each mapped area with a particular range of values. All three programs offer solid-color fill, and users can specify any color for any data range (see Figures 2 and 3). All three programs support the Plantronics ColorPlus board, which displays 16 colors.

With *Atlas* and *Statmap*, you have the option of using hatching instead of solid colors. This makes mapping possible on a monochrome graphics screen such as the Compaq's. Hatching also enables you to plot more than one data type for each area, a process

known as multivariate analysis. If solid blue identifies areas of high unemployment, for example, blue hatching can specify the areas that are also subject to government assistance.

Atlas offers 20 preset patterns and solids, each available in 15 colors. With *Statmap,* users can specify single lines or cross-hatching, the angles of the lines, the spaces between them, and the color of each line.

Atlas's label function puts names and zip codes within the boundaries of each geographic area on both screen and plotter output. Users can select from three sizes of text and three colors. Labels can be moved on the screen and then plotted in their new positions.

The latest version of Statmap *comes with a superb graphics editor that enables you to perform full-screen editing, choose from several text fonts and sizes, and superimpose one image or label on another.*

Titles and Labels

Every map needs a title and a color key to explain what the map means. *DIDS JR* produces two primary and secondary titles for maps, as well as color-key titles, color-key boxes, and footnotes. The color key includes up to six colored squares representing range values. *Atlas* offers only one title line. You can also create a secondary title and a color-key title, but they will be too small to read on the screen. The *Atlas* secondary title is generally used for plotter output.

Atlas and *DIDS JR* are primarily plotter oriented. To save space on screen, they stack the data values in the color key. Although this arrangement is legible on plotter output, reading the color-key legend on the screen can be difficult.

DIDS JR cannot vary text size, but it can label a map after it is created. You can also overlay a zip code map on a tract map to see the relationships between the two. *DIDS JR* also has a unique Query command that enables you to move the cursor anywhere on the map, press a key, and see the name or the geographic code for that area.

The latest version of *Statmap* comes with a superb graphics editor that enables you to perform full-screen editing, choose from several text fonts and sizes, move images and text anywhere on the screen, and superimpose one image or label on another.

Statmap and *Atlas* images can be edited using the Colormagic program that comes with the Plantronics ColorPlus board. With this program, users can switch colors, move images, and add text, parts of other maps, and artwork.

Zooming In

Quite often, a map has many small areas that cannot be easily differentiated. All three programs solve this problem with "zooming," a feature that is common in computer-aided design packages. With minor variations, all three programs allow you to move a target box with the cursor keys, change its shape, and magnify the area within the box (see Figures 4 and 5).

DIDS JR can magnify a map to the second and the fourth power. A third zoom returns the map to its original size. An unlimited number of zooms of any magnification can be performed with *Statmap.* Although a zoomed image cannot be magnified a second time, users can quickly switch back to the original image and zoom in on a different area or at a different magnification. You can reset all features for each magnification and even switch boundary or data files to draw a different map.

With *Atlas,* maps can be zoomed in and out an unlimited number of times. A zoomed image can itself be zoomed. All facets of the map, including boundary and data files, can be switched while you are defining the map.

Image Processing

Once you have created an image on the screen, you can either print it or save it in an image file. Hard copy can be plotted on paper or acetate foils for overhead viewing. Map images can also be recalled and viewed at a later time or made into slides.

All three programs work with pen plotters (see Table 1). *Atlas* produces any number of plots, of any size, anywhere on the page. *Statmap* allows full-page and

quarter-page plots. *DIDS JR* plots a full page only. For each map it draws, *Statmap* offers screen or plotter output, or both. With *Atlas* and *DIDS JR*, screen images must be created before plotting. All three programs support low-resolution output on dot matrix printers, and *Statmap* and *DIDS JR* support color printers.

All three programs allow you to save images, which can then be photographed and made into slides with slide generators from Celtic Technologies, Lang Systems, or Polaroid (see "60-Second Slides," *PCW*, Vol. 2, No. 9). The results can be incorporated into a slide program or made into color separations for printed publication.

With the STATCAT utility, *Statmap* users can create a PC-based slide show. Images can be recalled to the screen in any order and for any duration. This feature is useful for sales presentations and demonstrations.

Speed

All three programs are fast. A demonstration map of 21 New Jersey counties, with colors, a color key, titles, and boundaries took only 54 seconds with *Statmap* and 105 seconds with *DIDS JR* (see Figures 2 and 3). Part of the time difference was due to greater detail in the *DIDS JR* boundary file. A New Jersey boundary file was not available for the *Atlas* review, but the program draws as fast as *Statmap* and *DIDS JR*. (A test of *Statmap* on the PC AT ran 67 percent faster than on the XT.)

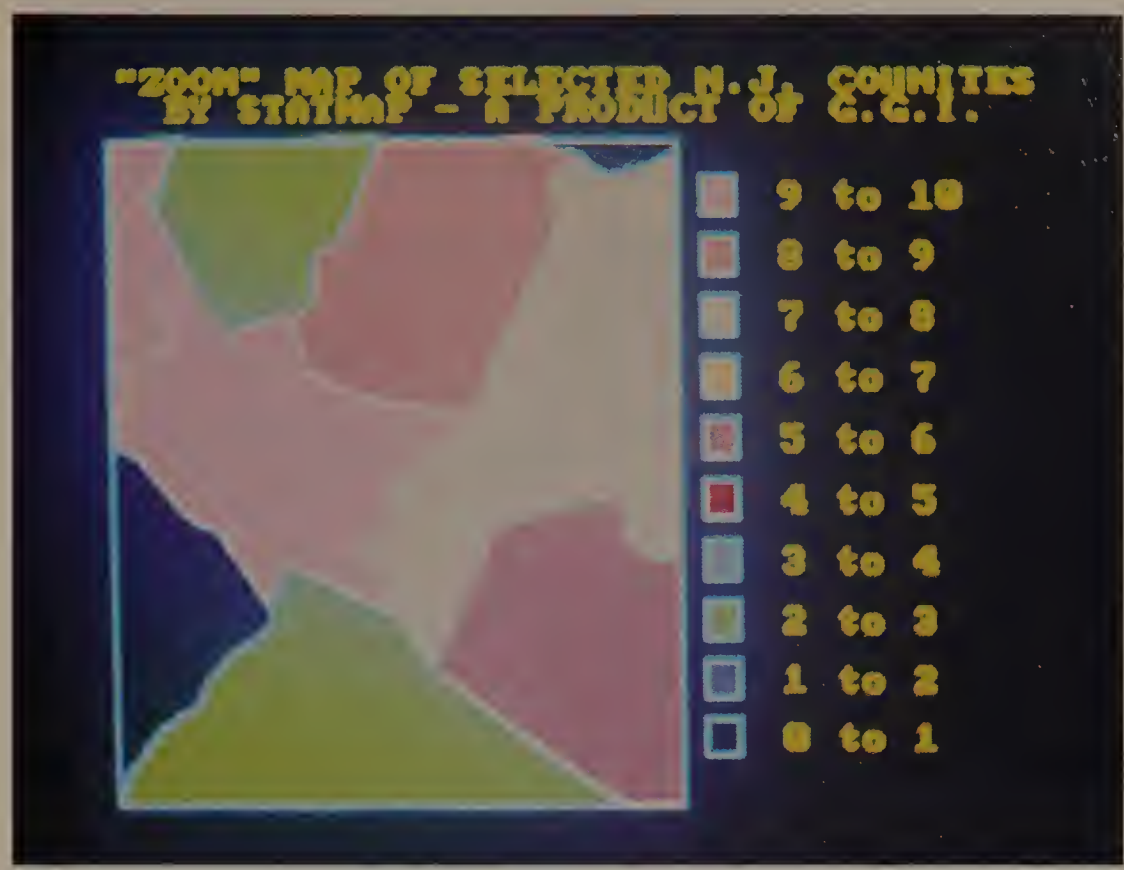

Figure 4: A magnified section of Figure 2 from Statmap. The zoom feature, found in all three programs, enables you to take a closeup shot of any map.

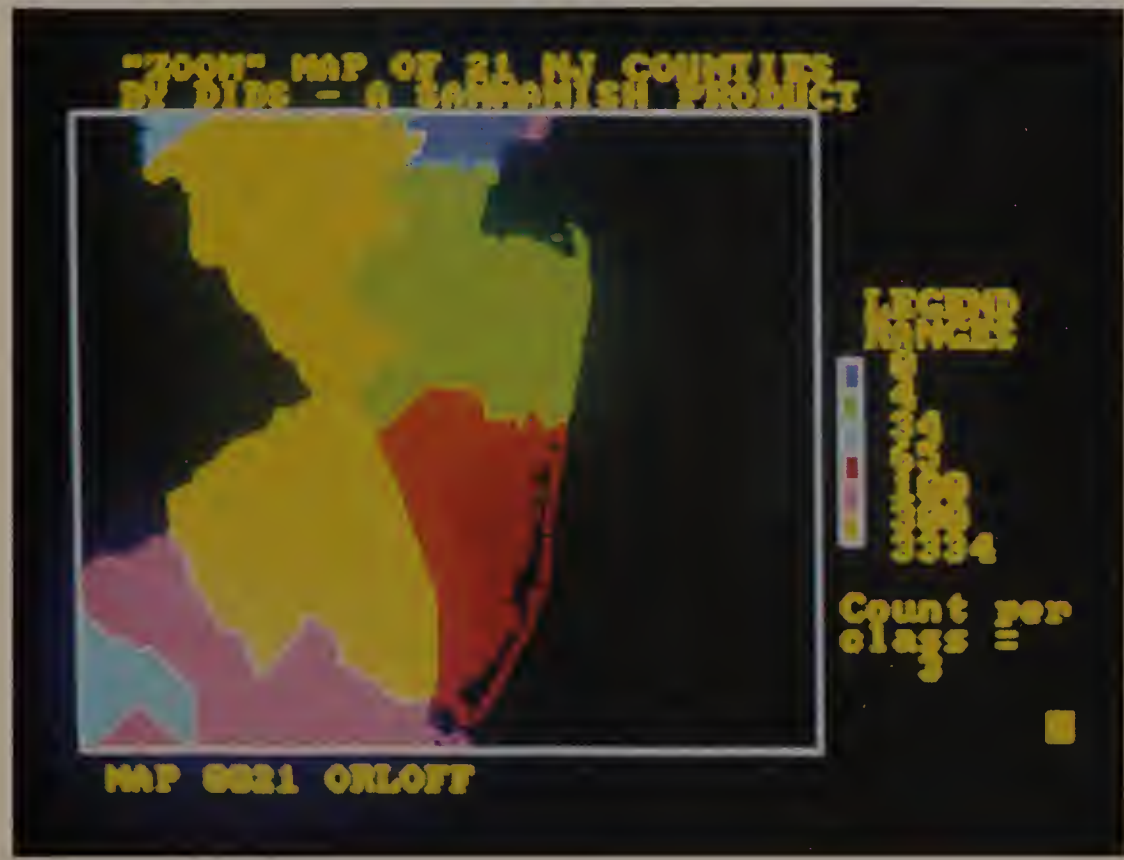

Figure 5: A magnified section of Figure 3 from DIDS JR. New Jersey never looked better.

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Presentation or Analysis? Of the three mapping programs, *Statmap* does the best job of combining both analysis and presentation functions. It can quickly draw a map to help users make decisions under deadline pressure. The simple menu-driven operation minimizes learning time, and the program's ability to incorporate text and high-resolution art allows users to create sophisticated graphics. *Statmap*'s built-in slide-show function is icing on the cake.

DIDS JR is primarily an analysis package. If the data range titles in the color key were easier to read and the images could be saved for use in a slide show, *DIDS JR* would be a strong contender in the presentation class. *DIDS JR* is fast, creates excellent images, and offers many easy-to-use options. Like *Statmap, DIDS JR* can plot on both paper and overhead transparencies. The program costs less than *Statmap,* but you need to buy several additional utilities to bring its performance up to *Statmap*'s level.

Atlas's 20 data ranges and 300 hatch patterns offer more choices than do the other two packages, but the selection is probably greater than most users need. The unreadable second title line and color-key titles limit *Atlas* primarily to hard copy uses. Otherwise, *Atlas* is an exciting program to work with. All commands are called with the function keys, and the range and plotting options are extensive. *Atlas* is the most interactive program of the three, enabling users to call up any function at any time and even create a new map without having to back up through the program.

Like bar and pie charts, maps can make data come alive. But mapping programs' greatest value comes from their capacity to reduce numerous pages of data into simple graphics that reveal important geographic and demographic relationships. All three programs can help you see geographic data clearly and quickly without having to digest reams of statistics. ●

Richard W. Orloff is the research manager at the Asbury Park Press *in New Jersey. He has delivered a number of presentations on making maps with the microcomputer.*

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San Jose, CA 95117
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DIDS JR
Sammamish Data Systems
P.O. Box 70382
Bellevue, WA 98007
206/644-2442
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Requirements: 128K, two disk drives, color graphics board

Statmap
Ganesa Group Int'l
1495 Chain Bridge Rd. #300
McLean, VA 22101
800/638-2225, 703/442-0442
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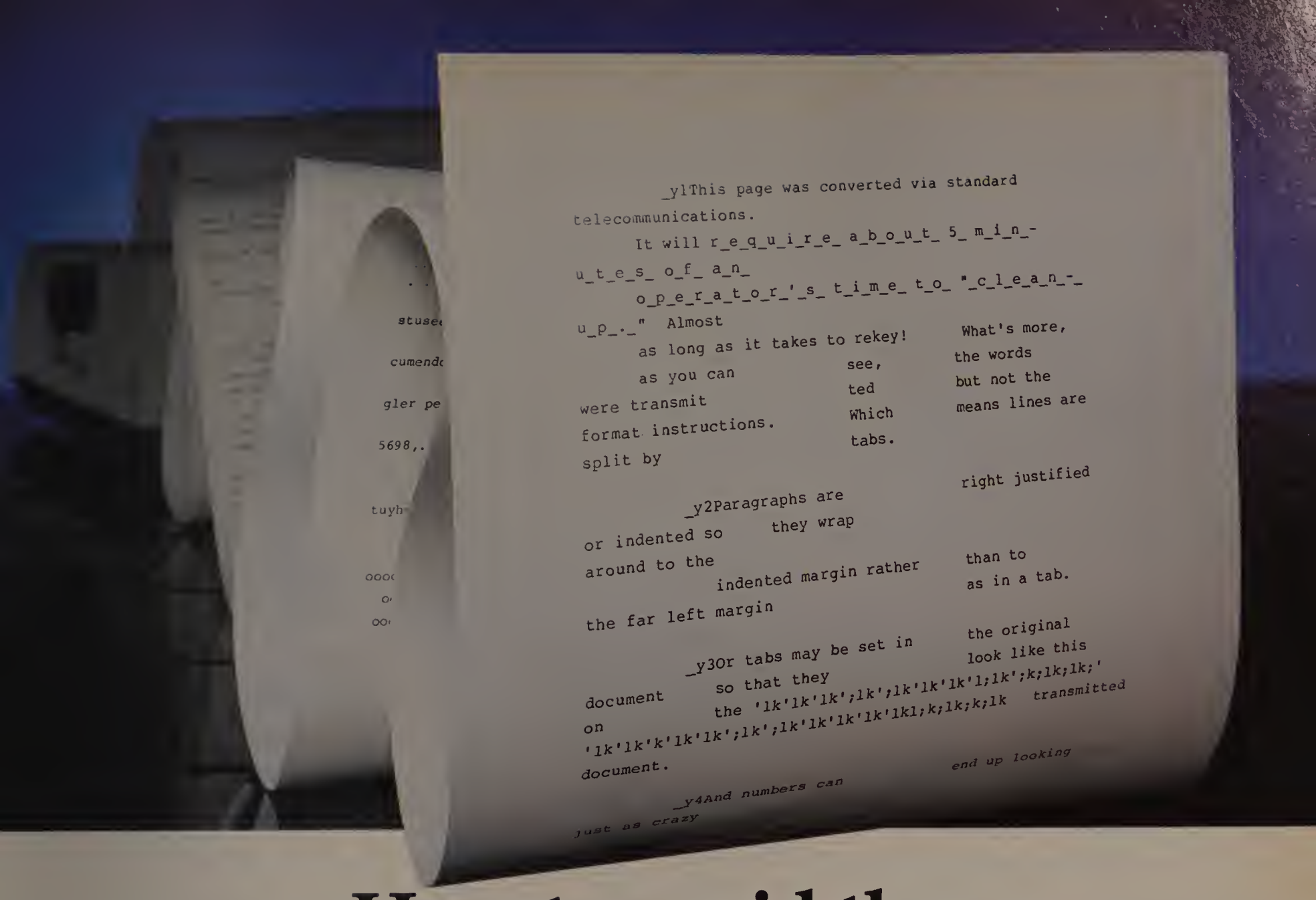

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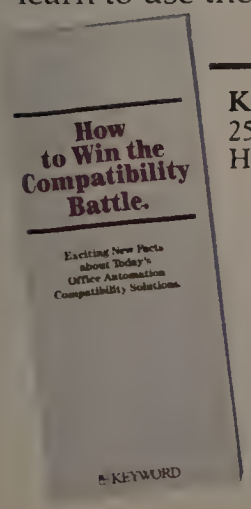

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PCjr WORLD

January 1985

The PCjr Magazine

PCjr's Great Graphics

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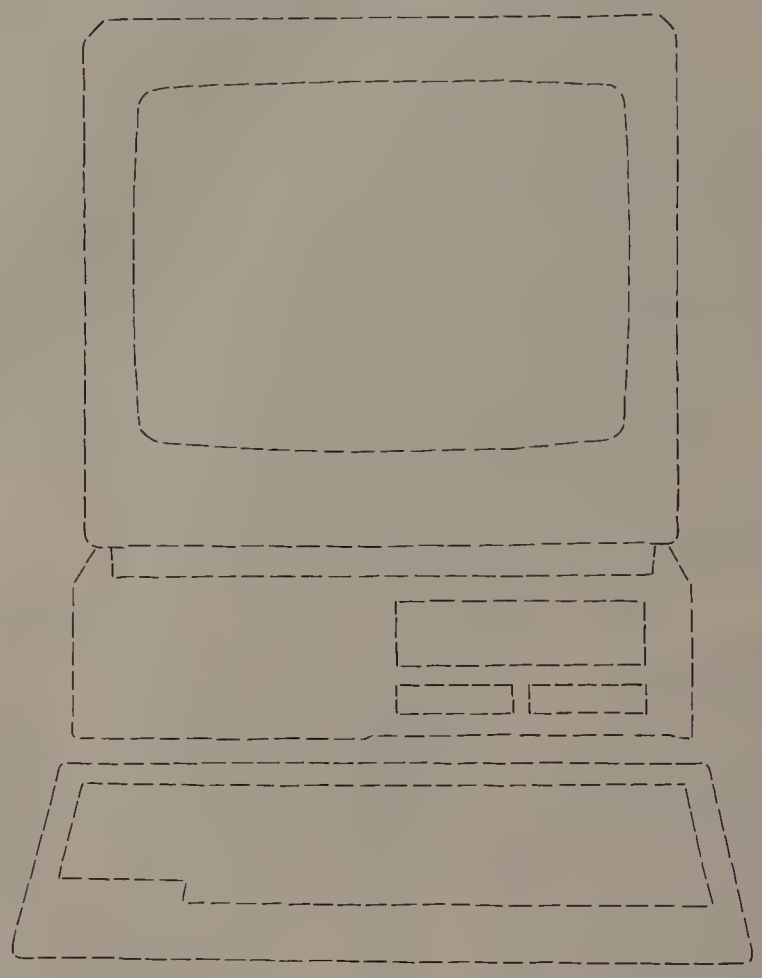

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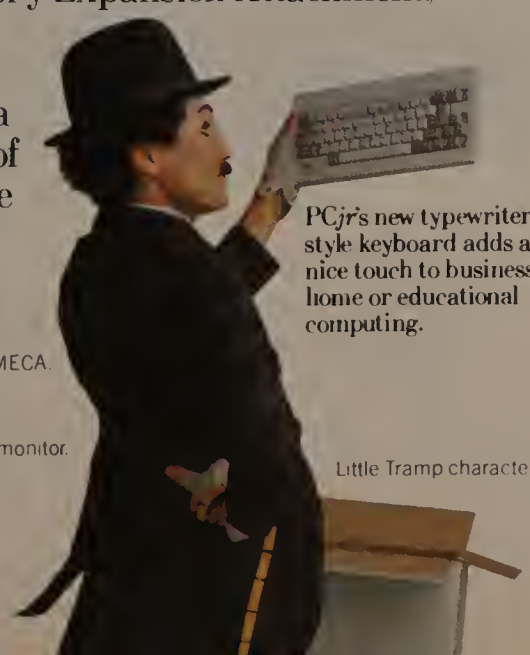

PC*jr*'s new typewriter-style keyboard adds a nice touch to business, home or educational computing.

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Circle 748 on reader service card

PCjr's enhanced graphics bring more colors to BASIC programs.

The Graphics Advantage

Peter von Stackelberg

In the not-so-distant past, microcomputer graphics primarily displayed attacking aliens. These days, however, personal computer graphics are performing more serious chores. Some PC programs turn long, difficult-to-comprehend columns of numbers into colorful, easy-to-understand graphs. Sophisticated computer-assisted design (CAD) software helps in planning buildings, electronic circuitry, and machinery. And educational programs illustrate complex concepts with colorful graphics images.

When the IBM PC was introduced in 1981, the capabilities of the IBM Color/Graphics Adapter were best described as "adequate." Since then, the PC and the Color/Graphics Adapter have been outclassed by many other 16-bit microcomputers, such as the Tandy 2000 and the Mindset, and by third-party graphics boards, such as the Hercules Color Card and IBM's new Professional Graphics Controller.

The PCjr's enhanced graphics capabilities, which offer three different screen resolutions with a greater variety of colors than the PC's, make the machine a natural for running educational and entertainment software. These same capabilities can make complex business charts and graphs more understandable and attractive.

Now that IBM and third-party manufacturers have announced expansion units for the PCjr, the computer has enough power and memory to be a serious business machine. And you can take advantage of the differences between the PC's and the PCjr's graphics capabilities.

Figure 1: The PCjr's low-resolution SCREEN 3

Figure 2: The PCjr's medium-resolution SCREEN 1

Figure 3: The PCjr's high-resolution SCREEN 2

Favorable Resolution

A computer's graphics screen is made up of dots that are arranged in an invisible, rectangular matrix. Dots, or points, in the matrix are known as pixels, or pels (contractions of the words *picture elements*). In BASIC, the location of each pixel is designated by a specific set of coordinates. The more pixels a computer graphics screen has, the higher the resolution.

The PC offers two graphics modes: medium and high resolution. These modes are set with BASIC's SCREEN statement. In the medium-resolution graphics mode (SCREEN 1), the PC displays 64,000 individual pixels—320 pixels horizonally by 200 pixels vertically—each of which can be any of four colors. The PC displays 640 by 200 pixels in high-resolution graphics mode (SCREEN 2). In this mode, only two colors—black and white—are normally displayed. (Another color can be displayed instead of white. See "Colorful Tip" in this month's *.*.)

Cartridge BASIC gives the PCjr six graphics screen modes. In addition to SCREEN 1 and SCREEN 2, the PCjr offers SCREEN 3, a low-resolution graphics mode of 160 by 200 pixels with 16 colors; SCREEN 4, a medium-resolution graphics mode of 320 by 200 pixels with 4 colors; SCREEN 5, a medium-resolution mode of 320 by 200 pixels with 16 colors; and SCREEN 6, a high-resolution graphics mode of 640 by 200 pixels with 4 colors. SCREEN 5 and SCREEN 6 are only available on PCjrs enhanced with the 64K IBM Memory and Display Expansion Board.

The following program displays low-resolution text and graphics on the PCjr:

```
10 KEY OFF: CLS
20 SCREEN 3
30 PRINT "Low Resolution"
40 PRINT "16 colors"
50 PSET (80,100),3
60 CIRCLE (80,100),50,1
```

When you run the program (see Figure 1), you will see that the letters in the message at the top of the screen are wider than the letters you saw when you entered the program. A line of text displayed on the screen in this mode is 20 characters wide. You will also see that the pixel in the center of the circle is wider than it is high; in this mode, the screen is 160 pixels wide.

The cursor is made up of 64 pixels—it is 8 pixels high by 8 pixels wide. The black horizontal "lines" that appear within the cursor and the characters are slight gaps between the vertical pixels. Horizontal pixels aren't separated by such noticeable gaps.

To see what this program looks like in medium-resolution mode, change lines 20 through 40 to

```
20 SCREEN 1
30 PRINT "Medium Resolution"
40 PRINT "4 colors"
```

When you run the revised program (see Figure 2), you will notice that the text is thinner than it was in low-resolution mode. What may not be as obvious, however, is that the text and the cursor are the same height in both modes—only their widths have changed. Actually, it is the width of each pixel that has changed.

The differences in widths can also be seen in graphics images. If you look closely at the pixel in the center of the circle, you can see that it appears to be rounder than in low-resolution mode. Its shape has changed because the width of a pixel in medium-resolution mode is half that of a pixel in low-resolution mode.

To set the computer in high-resolution mode, change lines 20 through 40 of the program to

```
20 SCREEN 2
30 PRINT "High Resolution"
40 PRINT "black and white"
```

Text and graphics are even thinner in high-resolution mode than in medium-resolution mode (see Figure 3). A pixel is now half the width it was in medium-resolution mode and one-quarter the width it was in low-resolution mode.

Different Coordinates

As you changed from low- to medium- to high-resolution mode, you probably noticed that the circle moved to the left of the screen. The coordinates specifying the center of the circle remained at '(80,100)', and the circle's radius did not change. Why the change in the circle's position?

In low-resolution graphics mode (SCREEN 3), the coordinates '(80,100)' specify the center of the graphics screen, so the center of the circle is at the center of the screen. The coordinates at the center of a medium-resolution screen are '(160,100)', and those at the center of a high-resolution graphics screen are '(320,100)'. Since the coordinates for the center of the circle remained '(80,100)' in each of the programs, the circle was drawn further to the left with each successive program.

Figure 4: The PCjr displays 16 colors in SCREEN 5.

Video Display

The PC's Color/Graphics Adapter is equipped with 16K of RAM for the video display buffer. The PC's video display buffer holds data that is translated by a video display chip to produce variously colored pixels at the appropriate positions on a color display. The degree of resolution and the number of colors a computer can display are directly related to the size of the video display buffer. Unlike the PCjr's video display buffer, the PC's is not counted in the amount of installed memory.

The PCjr does not use the Color/Graphics Adapter; it has its own video display circuitry. And the PCjr does not have RAM dedicated as a video display buffer. Instead, part of the PCjr's user RAM serves as

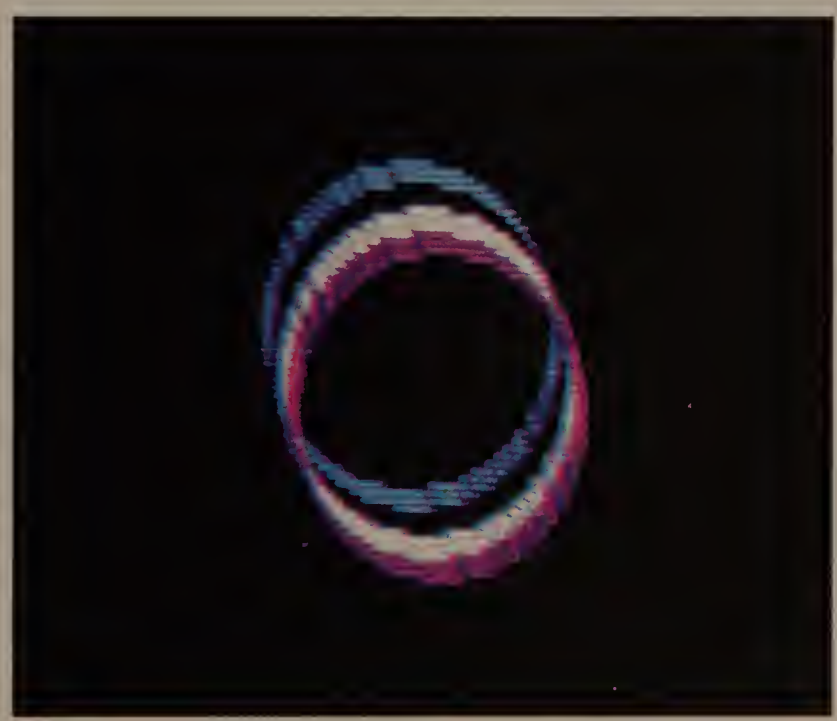

Figure 5: The PCjr displays 4 colors in SCREEN 6.

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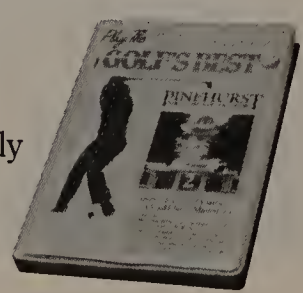

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the video display buffer. The PCjr's SCREENs 1 through 4 each use 16K of RAM, leaving 48K of RAM (on 64K entry model PCjrs) for other tasks, such as holding the operating system and application programs. SCREENs 5 and 6 use 32K of RAM (leaving 96K free) and, as mentioned earlier, are only available on 128K enhanced PCjrs.

The PCjr automatically sets aside 16K of RAM as the video buffer each time the computer is turned on. If you want to use SCREEN 5 or SCREEN 6, you have to tell the machine to reserve an additional 16K of RAM for the video buffer. That task is done with BASIC's CLEAR statement. To run the sample program in SCREEN 5, change lines 20 through 40 to

```
20 CLEAR ,,,32768!: SCREEN 5
30 PRINT "Medium Resolution"
40 PRINT "16 colors"
```

To see all 16 colors (see Figure 4) of SCREEN 5, add the following lines:

```
50 FOR I=1 TO 48 STEP 3
60 FOR J=1 TO 3
70 CIRCLE (60+I+J,70+I+J),50,I MOD 16
80 NEXT
90 NEXT
```

To set the PCjr to SCREEN 6 and see its four colors (see Figure 5), revise the program as follows:

```
10 KEY OFF: CLS
20 CLEAR ,,,32768!: SCREEN 6
30 PRINT "High Resolution"
40 PRINT "4 colors"
50 FOR I=1 TO 12 STEP 3
60 FOR J=1 TO 3
70 CIRCLE (60+I+J,70+I+J),50,I MOD 4
80 NEXT
90 NEXT
```

Note that lines 20 through 50 and line 70 have changed. When you run the program, the text and graphics will be drawn the same size as in the other high-resolution mode, SCREEN 2. The only difference is that in SCREEN 6, you can draw images in four colors.

Peter von Stackelberg is an author and programmer who lives in Edmonton, Alberta, Canada. He has written two books on graphics for the IBM PC and the PCjr that will be published this spring by Harper & Row.

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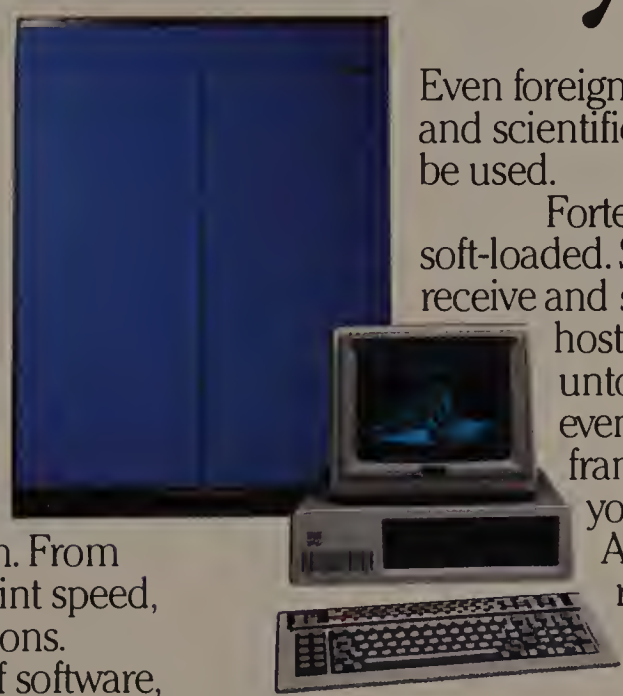

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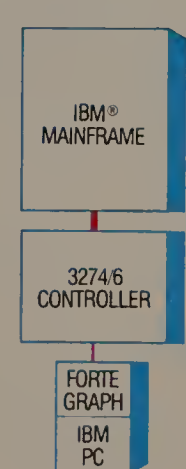

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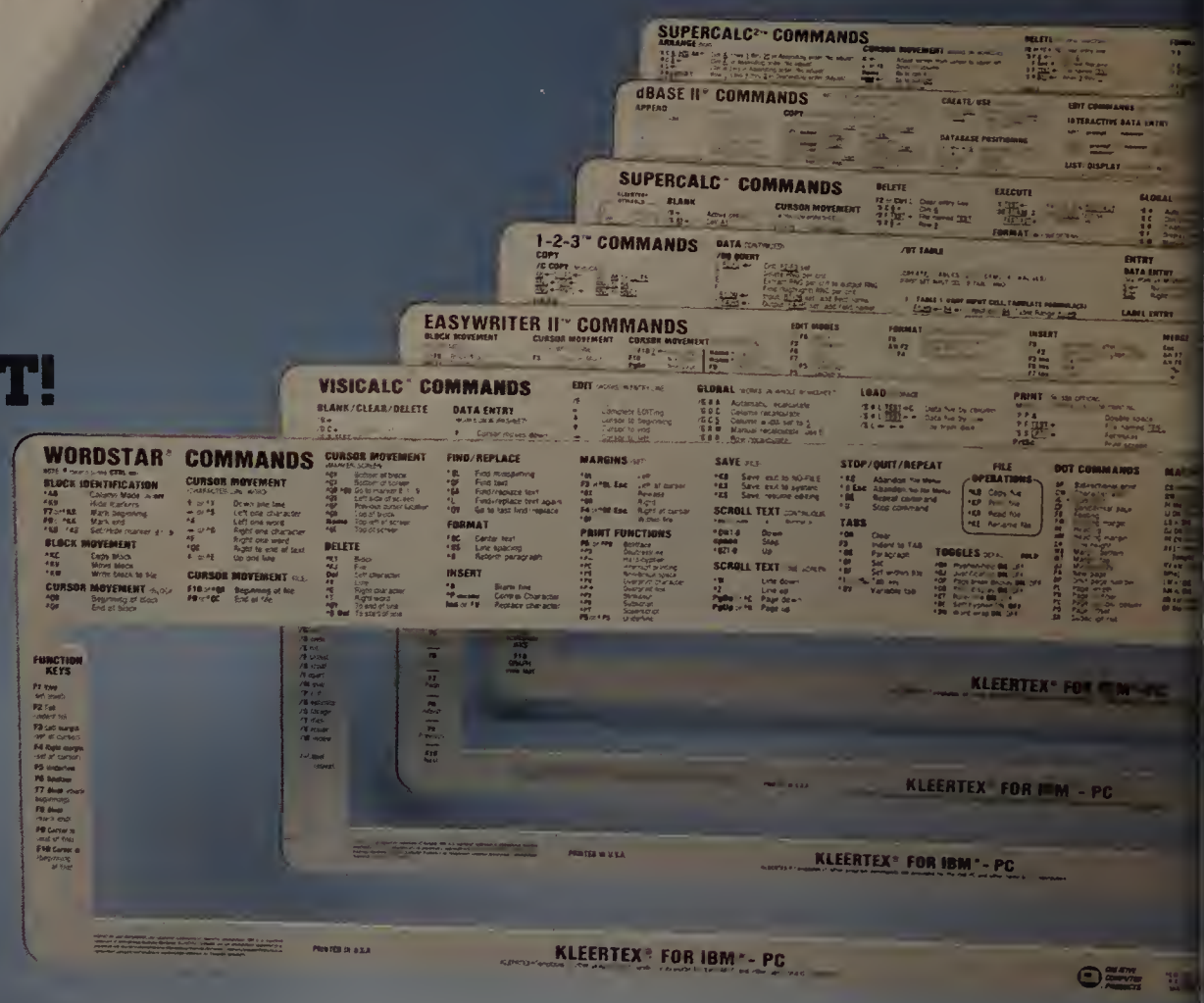

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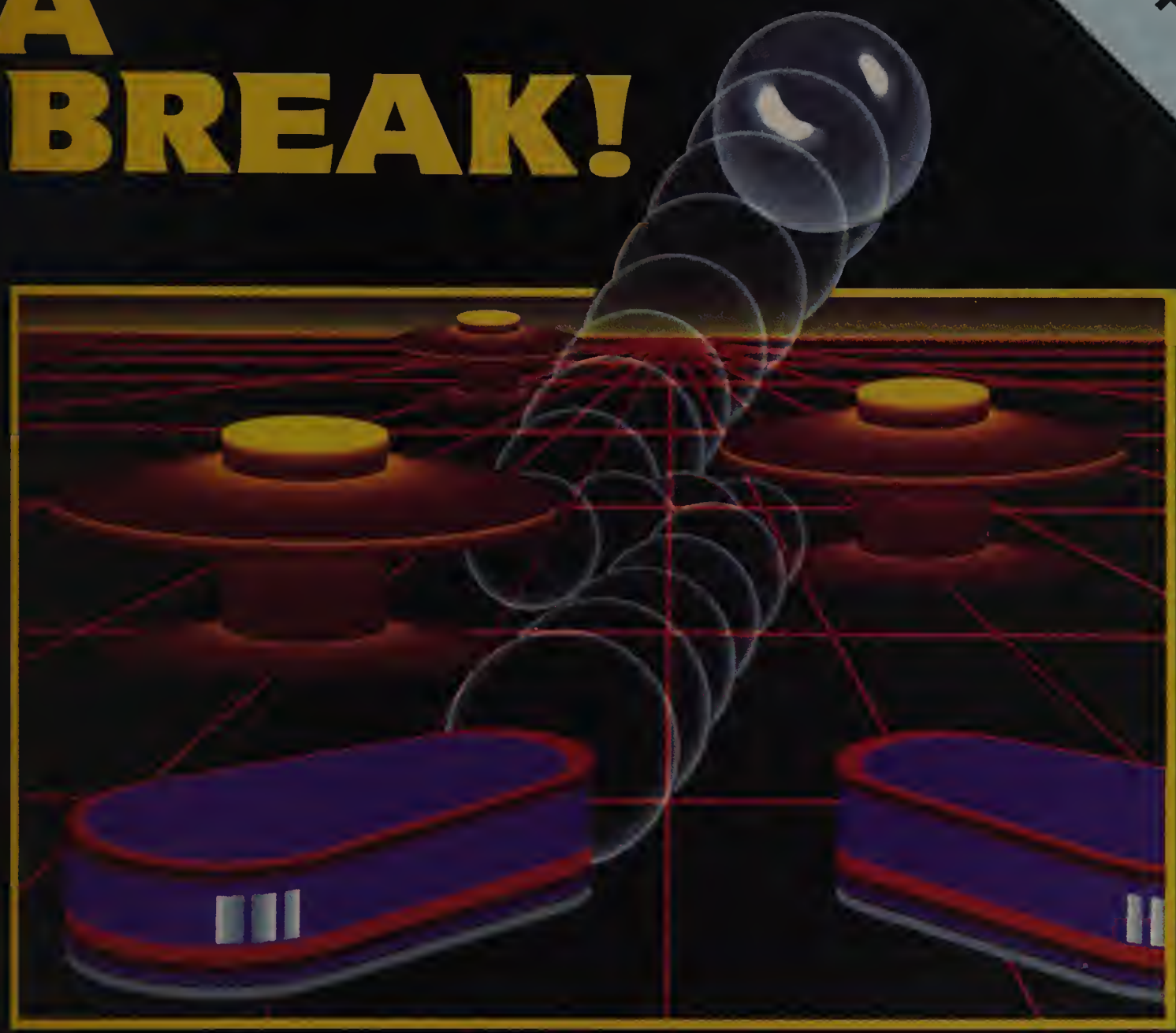

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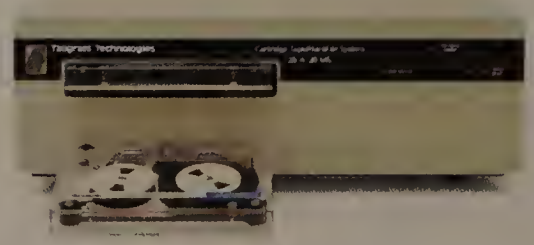

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HEAVY DUTY

Personal Robots: The PC on Wheels

Industrial robots are revolutionizing the factory, but what happened to the dream of creating a mechanical human? The personal robot industry is booming, and one new robot uses the 8088 microprocessor for a brain. Yet the more powerful robots of the future may have to be programmed with Isaac Asimov's Three Laws before they can safely be used in the home.

Dana Blankenhorn

In his novel *I, Robot,* Isaac Asimov describes 1996 as the dawning of an age of robots. He introduces us to Robbie, a "mechanical man" who can walk, talk, and play nursemaid to an 8-year-old girl. Today we're right on schedule as we move toward creating powerful personal robots that can act as servants, tutors, security guards, and mobile personal computers. Already a gaggle of young companies anxiously vie for position in an industry that may someday dwarf the likes of General Motors and U.S. Steel.

Today's personal robot business has the crazed-hobbyist flavor of the personal computer cottage industries of the late seventies. Most personal robots are made by small companies or by individuals working out of their basements and garages. But like the PC pioneers, many robot makers see dollar signs at the end of their personal rainbows. Once PCs have thoroughly infiltrated the homes and offices of the world, the robot may become the next big consumer item.

So far, personal robots are somewhat limited in utility, but if you think of them as mobile PCs with the potential for expansion, you begin to see their possibilities. Already, personal robots can walk, talk, respond to voice commands, carry small loads, and detect smoke, radiation, and human beings. Many personal robots can be programmed and controlled by personal computers through an RS-232C interface, a remote infrared connection, or a radio. Some robots contain full-fledged programmable computers.

Brains on Board

A few robot companies are finding a measure of commercial success by selling the latest in home-appliance status symbols. The most popular models include the RB5X from RB Robot Corporation and the HERO 1 from Heath Company. Like other Heath products, the HERO 1 can be purchased in kit form and assembled by the user at significant savings.

Another robot leader is Androbot, launched by Atari founder Nolan Bushnell. Androbot has a line of somewhat humanoid robots designed for education and entertainment. For example, Topo, which is programmed in FORTH and controlled by an infrared beam directed from a personal computer, can talk, sing, move about, and carry small loads.

However, Topo's new brother, B.O.B. (Brains on Board), has taken a big step out of the toy category toward becoming a truly useful personal robot. B.O.B.'s brain is the 8088, the same microprocessor used in the IBM PC. "We think he can run Lotus," says Bill Burton, Androbot's director of sales and marketing.

At least 285 B.O.B./XAs (*XA* means expandable) started rolling off Androbot's assembly lines in September, headed for software and hardware developers. They don't look like much–just PCs with wheels and lots of empty ports and slots waiting for expansion boards.

Reminiscent of Star Wars' R2D2, HERO 1 (top) and HERO JR (bottom) are available from Heath Company in kit form or fully assembled.

But even stripped down, B.O.B. is a vast improvement over Topo. Although B.O.B. is currently controlled by a built-in telephone touchpad, a full keyboard is in the works. B.O.B. also has two ultrasonic sensors and two bar-code readers to see with. The ultrasonic sensors judge distance much like a dolphin or radar does. The bar-code readers can spot any object tagged with special bar-code tape. With the help of the ultrasonic sensors, B.O.B. can pick up the tagged object with a built-in forklift.

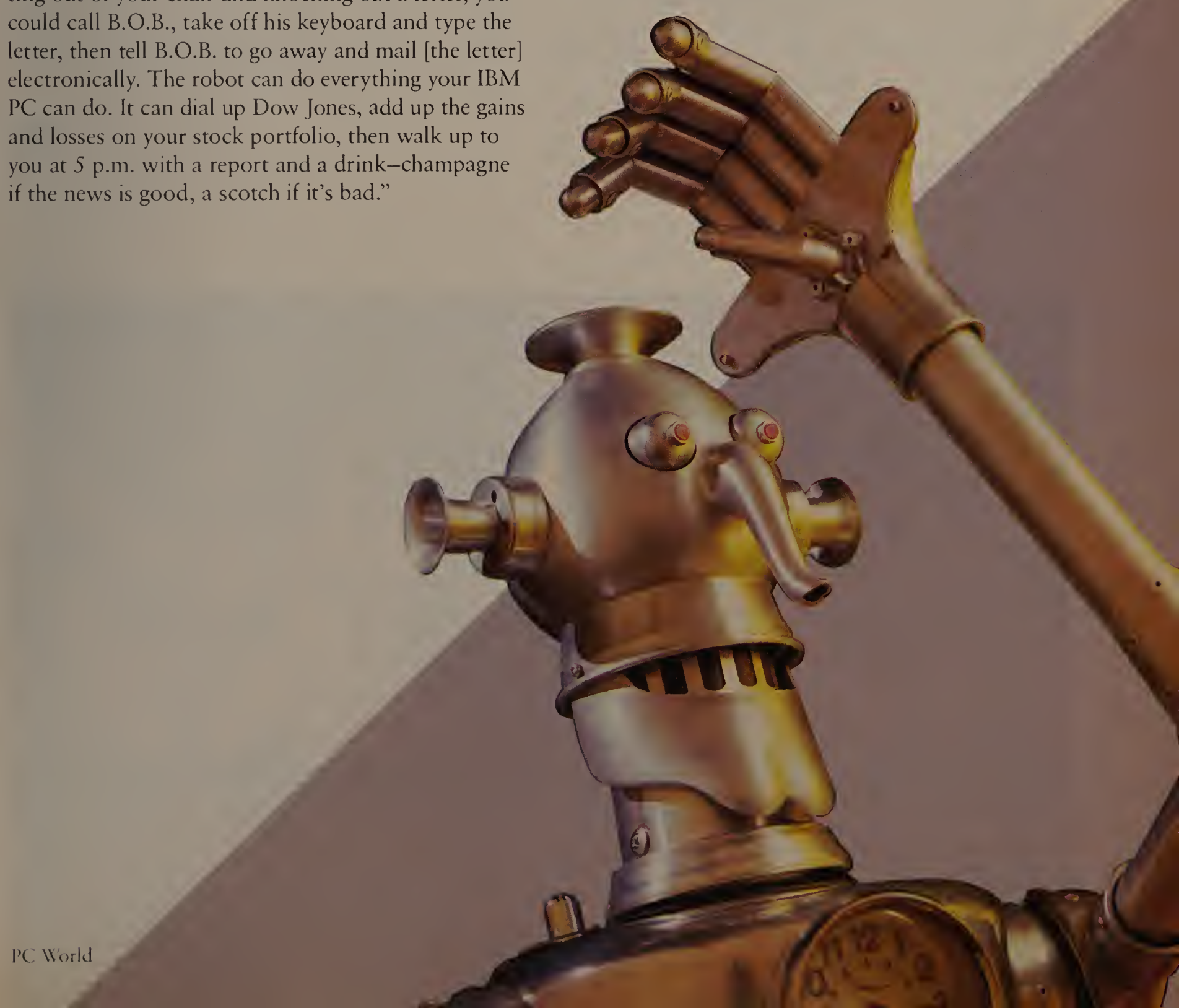
This is only the beginning. Androbot has left the design as open as possible, hoping computer companies will be inspired by those vacant ports to create applications that will make robots sell. An enhanced B.O.B. should be ready for consumers by Christmas of 1985.

"Forget the preconceived notion of Buck Rogers," says Burton. "Think of [the robot] as a PC with sensors and the ability to move. Instead of getting out of your chair and knocking out a letter, you could call B.O.B., take off his keyboard and type the letter, then tell B.O.B. to go away and mail [the letter] electronically. The robot can do everything your IBM PC can do. It can dial up Dow Jones, add up the gains and losses on your stock portfolio, then walk up to you at 5 p.m. with a report and a drink—champagne if the news is good, a scotch if it's bad."

Programming Robots

Many observers believe that before personal robots are given the power to act independently, they will need some kind of programmed restraining code to make them safe. Isaac Asimov pondered this problem back in the 1940s, when he came up with "The Three Laws of Robotics," presented in *I, Robot* (Gnome Press, 1950; Doubleday, New York, 1977). Robot designers and programmers have considered these laws, but nobody has yet been able to implement them. Many doubt that artificial intelligence will ever reach the level at which situational laws can be programmed.

When better robots are built, they'll most likely be programmed in FORTH, a language created by Charles Moore in the early 1970s. FORTH is already the most popular language for industrial robots, and it may become the language of choice for personal robots as well.



FORTH is particularly applicable to robotics because it can be extended easily. Once you define the word *parent,* for example, as meaning either *mother* or *father,* you can use it instead of those words in subsequent commands. Through extensions, you can teach a FORTH computer, or robot, the way you might a child.

Moore feels that discussing the Three Laws in connection with today's robots is premature, because B.O.B. "wouldn't even nudge the needle on an IQ scale."

Designing truly useful robots requires an understanding of the robot's world, Moore adds. "The human world is very different from the machine world. The machine doesn't get hungry, and it doesn't fall in love, but it is concerned with whether buttons get pushed and whether it gets recharged."

Rather than trying to build an automatic human, Moore thinks we should program a machine to squash bugs on a farm or program a car with Doppler radar to avoid collisions. "All the auto has to do is preserve its own existence (the Third Law), and humans won't come to harm."

Still, Moore admits that the idea of building a mechanical human is intriguing. When asked about building a robot by 1996 (the year of Robbie's creation in *I, Robot*), he thinks a moment, then grows excited. "That could be, it really could. There's a puzzling aspect of science fiction that tends to make it self-fulfilling."

Legs and Feet

To create advanced robots that imitate humans, robot designers will have to clear a number of hurdles. Some, like the Three Laws, are theoretical. Most, however, are scientific and technical. Simulating the legs, arms, ears, eyes, and mouths of humans is no easy task.

For example, take the problem of manufacturing legs and feet. So far, robot makers have shunned the complex human model in favor of a sturdier wheel-based system. However, squatness can pose problems. Giving a robot the ability to move across a flat surface is fairly easy, but designing a robot that can go up stairs or move without knocking things over is more difficult.

Androbot's new B.O.B. robot surrounded by less sophisticated Topos. B.O.B.'s "brain" is an 8088 microchip. Optional expansion boards and a keyboard may turn B.O.B. into a PC on wheels.

Bill La, president of Metamotion, thinks he has a solution to the leg problem. He wants to apply the knowledge his company has acquired making wheelchairs.

"We have three omnidirectional wheels in a triangular arrangement," says La. "The wheels have peripheral rollers so they can provide traction. They can also move sideways with the rollers, which are idle. The three wheels are independently driven, and the combined action lets you move in any direction or pivot under power." La's invention will let robots do at least one thing today's robots can't do: walk up stairs.

Still, that's only a beginning, and some personal robot boosters get discouraged by the lack of progress. Howard Dicken, publisher of *Technology Trend* newsletter in Tucson, says, "Our electronics and calculating capability is way ahead of our mechanical ability, at least as far as moving is concerned." Dicken came out of a robotics conference in Chicago last year thinking, We're applying the latest microprocessor to 100-year-old gear trains.

Metamotion's Fetal 1 robot demonstrates Bill La's omnidirectional wheel system. The three wheels are independently driven and enable the robot to move in all directions and pivot on a vertical axis. The Metamotion system is being adapted for electronic wheelchairs and robot plotters.

Arms and Hands

Most industrial robots appear to be nothing but arms fitted with grippers and tools instead of hands. American companies such as Unimation and General Electric, along with the big Japanese robot manufacturers such as Fujitsu Fanuc, manufacture robots that paint cars, assemble and weld parts, and take the place of real people to perform dangerous tasks.

Of course, these mechanical arms have all the charm and intelligence of a coffeepot. One Japanese robot arm killed a worker who wandered inside its work space. There are, however, some arms and hands that could be adapted to a home robot. Hitachi is experimenting with Shape Metal Alloy, a patented mix of titanium and nickel, in an effort to produce a hand that almost looks human, right down to the gripping fingers.

One of the best personal robot arms belongs to Microbot's Alpha, priced at under $10,000 and capable of handling loads of 1.5 pounds at speeds of up to 20 inches per second. Scientists have put Alpha to work measuring radioactive isotopes, and Qume Corporation has used it to load and unload floppy disks to test them for wear. Students at the University of Tennessee have combined an Alpha with a camera and two Z80 chips to make a robot that plays checkers.

Mouths and Ears

Microprocessor-based speech synthesis has arrived. The Alien Group of New York provides an inexpensive line of speech synthesizers that can accurately stress different syllables. The Alien synthesizers use a new SSI 263 chip, which generates a more natural speech pattern than previous systems. Alien's president Bob Lezzard says his newest model, which uses a standard RS-232C port, also lets the robot choose the correct words to say.

Using a programmed set of responses on the Alien synthesizers, a personal robot like B.O.B. could produce a wide range of speech. As to what such a synthesizer would do in the home, however, Lezzard

says, "The user decides his own application. We already have industrial applications, like telephone response systems."

Robots that can understand and distinguish random sounds are still a few years away, but robots that understand their master's voice exist now. With the help of a voice recognition peripheral called a Shadow/VET, from Scott Instruments of Denton, Texas, the RB5X robot has been responding to human voice commands for two years now. Unfortunately, to use Shadow/VET, the robot's owner must wear a bulky headset and record six vocal "printings" to teach the robot each command.

Balance and Touch

One major function of the human ear is balance. A mechanism in the inner ear lets us stand up straight and keeps us from falling. Robotic balance systems still work with gyroscopes, which are clumsy and inefficient. Touch sensors cost just a few dollars each, but they can't anticipate trouble the way your inner ear can. They can, however, tell a robot when it has already hit the floor.

Air Force major Bruce Taylor won a Golden Droid award at the First International Personal Robot Congress in Albuquerque, New Mexico, for Henry, a one-armed contraption that incorporates touch sensors and says "uh oh" when it runs into something.

Major Taylor started building Henry as a lark after reading a magazine series called "Build Your Own Robot for Under $400" in early 1983. "I've been disappointed in the personal robots that are commercially sold," says Taylor. "They don't do things that are useful." Once he puts a feedback loop in the drive motors, Major Taylor hopes to teach Henry to serve drinks.

Eyes

The evolution of robot eyes has advanced further than that of the other body parts. Micron Technology's Microneye costs $295, uses a standard RS-232C interface, and can produce machine-readable black-and-white screens of information at up to 15 frames per second. The core of this digitizing camera is an IS32 Optic RAM, developed by Micron, which is basically a 64K RAM chip modified for image sensing.

Carl Smith, a software engineer at Micron, expects that paired Microneyes will help robots in "locating objects, judging their size, and grasping them." With two Microneyes the robot would have stereoscopic vision, and thus depth perception.

Brains

How does the IBM PC measure up as a robot brain? Even with the best software, the 8088 is a chip, not a brain. But new artificial intelligence software could bring robots some mechanical learning ability. One person who's working in that direction is Nelson Winkless, president of Excalibur (and owner of a 1950 edition of *I, Robot*).

Winkless, the first editor of *Personal Computing,* has been promoting his ideas on the future of robotics for years. One medium for that campaign is science fiction—Winkless writes stories under the pen name Robert Russell—and another is programming. Excalibur's *Savvy* is a natural-language programming interface for data management that lets a computer (or robot brain) learn interactively, discovering, for example, that "get the phone," "answer the phone," and "grab the phone" mean the same thing.

In recognition of the growing abilities of today's personal robots, Winkless and Joe Bosworth, president of RB Robot Corporation, got together last year and dreamed up the First International Personal Robot Congress, which came off in Albuquerque last May. During the conference, which drew 2500 people, scientists and engineers engaged in the first serious discussion of how to apply Asimov's Three Laws of Robotics to personal robots. Dr. Asimov himself gave the keynote address. Asimov said that after the accidental killing of a Japanese worker by a robot, he received many calls asking about the Three Laws.

Joe Bosworth feels that implementation of the Three Laws will be necessary if robots are to become serious tools in the home. "I don't think you'll have robots with any strength or potentially dangerous capabilities until those three laws are clearly dealt with."

The Three Laws of Robotics

1. A robot may not injure a human being, or, through inaction, allow a human being to come to harm.

2. A robot must obey orders given it by human beings except where such orders would conflict with the First Law.

3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.

—from *I, Robot,* by Isaac Asimov (Gnome Press, 1950; Doubleday, New York, 1977)

Preventing a robot from causing direct harm can be done through sensors and a sophisticated operating system, Bosworth says. "I think it will be an operating system with enough interrupts and backup and triple-backup sensor systems, so that when a robot senses it's in danger of hurting anyone, it stops."

As to the second part of the First Law, which calls for a robot to act if a human is in danger of coming to harm, Bosworth is less sanguine. Panelists in Albuquerque spent a lot of time discussing the Kitty Genovese case, in which a young woman was assaulted and killed within earshot of an entire neighborhood, and no one came to help. If a robot helped in that case, would it not be more than human?

In any case, the introduction of robots into our daily lives will present new legal and moral questions. "Before automobiles came along, we didn't worry about speeding or drunk driving," Bosworth says. "But we've built a body of law that creates liability. We may be headed for something similar with robots."

Michael Ham, an expert on artificial intelligence and the FORTH language (see "Playing by the Rules," *PCW*, Vol. 2, No. 1), agrees that something like the Three Laws is desirable but points out that the laws would be very hard to implement. "Certainly some sort of guiding rules need to be provided to a household robot so it doesn't pop Fido into the washing machine when he dirties the carpet. The laws are going to have to be implanted in the situation, but whether that will be done in the robot's brain or by putting limitations on its mobility is unclear. You're asking for judgments in other dimensions besides environmental stimuli. We can't even implement these laws with people; it's hard to see how it could be done in machines."

Whether robots will harbor the necessary intelligence to make these judgment calls is hotly disputed in the Artificial Intelligence industry. Winkless of Excalibur thinks the Three Laws contradict each other; if anything, tomorrow's robots may be more like artificial dogs than artificial humans. Such robots could be "companions" for the elderly, taking medical readings and alerting the doctor if something goes wrong.

Manufacturers are naturally concerned about product safety in this litigious society—one reason contemporary robots are 98-pound mechanical weaklings. As Winkless notes, when robots acquire human and superhuman intelligence and strength, the Three Laws will be no longer an option but a necessity.

Dana Blankenhorn is an Atlanta-based freelance computer journalist doing business as Have Modem Will Travel.

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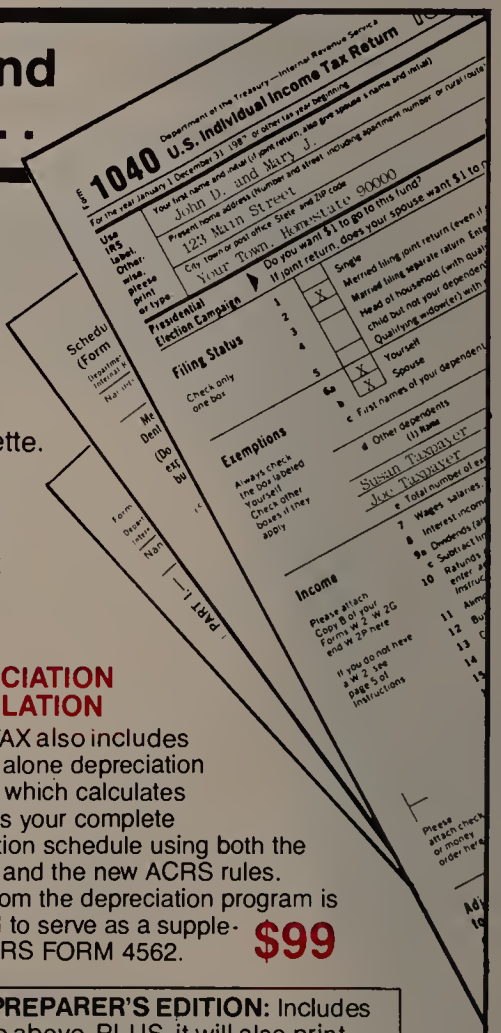

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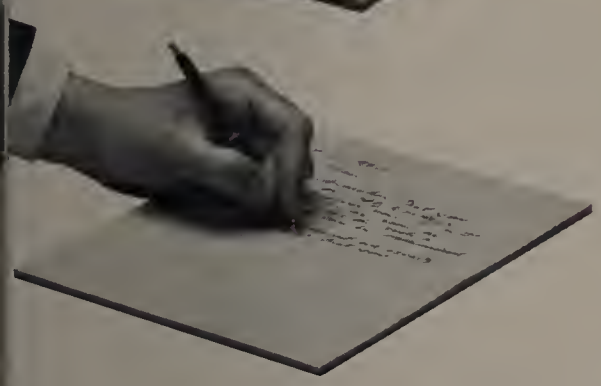
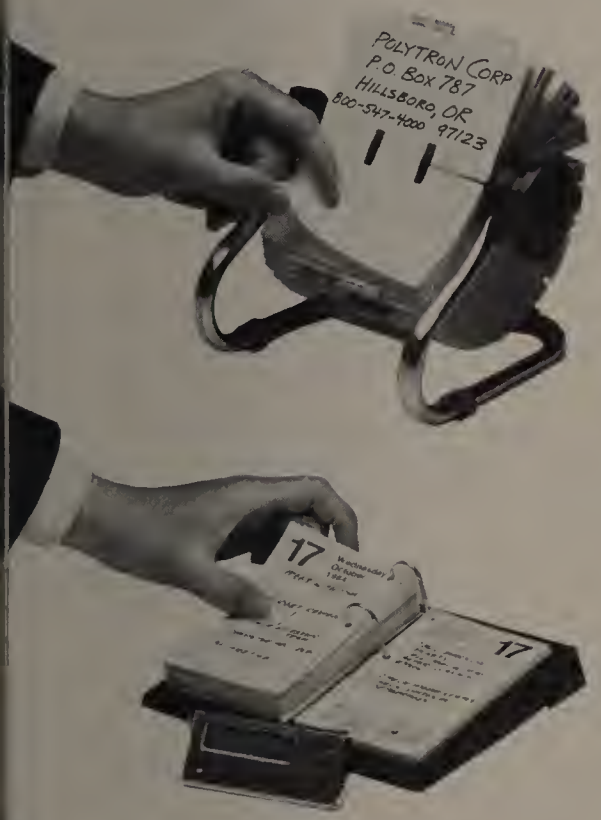
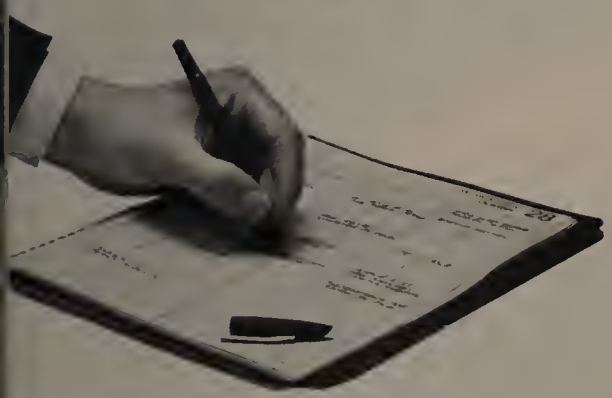
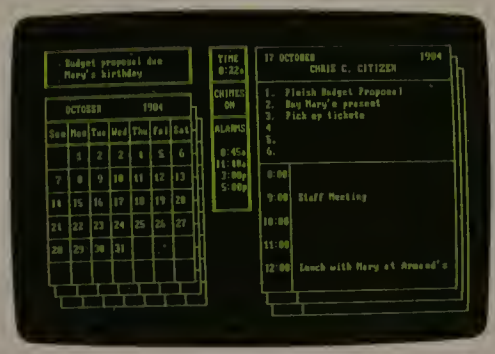




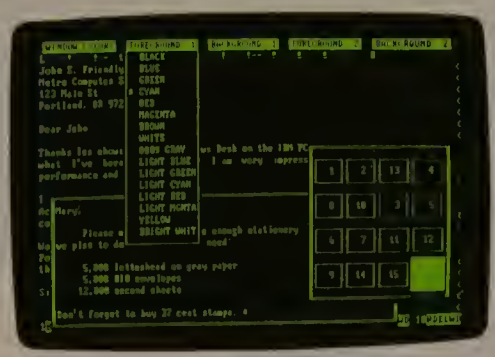


Calculator, Filedex over Wordstar

Memo Window Over Spreadsheet



Calendar, Alarm Clock, Appt. Book.



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Due Processing

PCs have begun to invade law offices, but they usually appear only on the desks of the legal secretaries. Now comes a word processor designed for organizing and planning. The Idea Processor's macros and text data management system are the perfect tools for a lawyer who's piecing together a case.

Paula Giese

Lawyers exemplify a new class of labor known as knowledge workers. As professionals who must condense enormous amounts of textual information under exacting deadlines, they can make good use of personal computers. Although many law firms use computers or dedicated word processors, most of their systems are designed for clerical work, primarily billing, accounting, and word processing. Only recently have lawyers recognized that with appropriate software tools, personal computers can assist them in thinking and planning.

One such tool is *The Idea Processor,* an integrated word processor and text data management system (TDMS) (see "A New Idea in Word Processing," *PCW,* Vol. 2, No. 11). Its uses in the law office also apply to other professions.

The Idea Processor was principally programmed by computer consultant Eric Mintz. While advising a New York brokerage, Mintz met a financial analyst who had clear ideas about his own information management needs. These needs proved to be essentially universal among professional people.

The financial analyst needed to bring together many types of information: text summaries, interview notes, spreadsheet analyses, and business graphics. He had to find and survey everything relevant to an analysis in progress for review, summary, and selective inclusion in a final report. The information he needed at his fingertips had many different formats and could not be forced into rigidly structured data bases. And the amount of information was voluminous.

Mintz studied the analyst's problem and came up with a solution: a word processor with a textual data base that could be referenced by both keyword and Boolean (AND, OR, NOT) searches. Thus originated *The Idea Processor*'s TDMS, the Cardfile. With the Cardfile you can access information stored in diverse formats for reference and for transfer into documents. Figure 1 is a conceptual picture of how *The Idea Processor* works.

The Idea Processor divides information hierarchically into *cabinets, drawers,* and *cards.* Any document or part of a document created in the program's Editor can be saved on cards for future

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Witnesses
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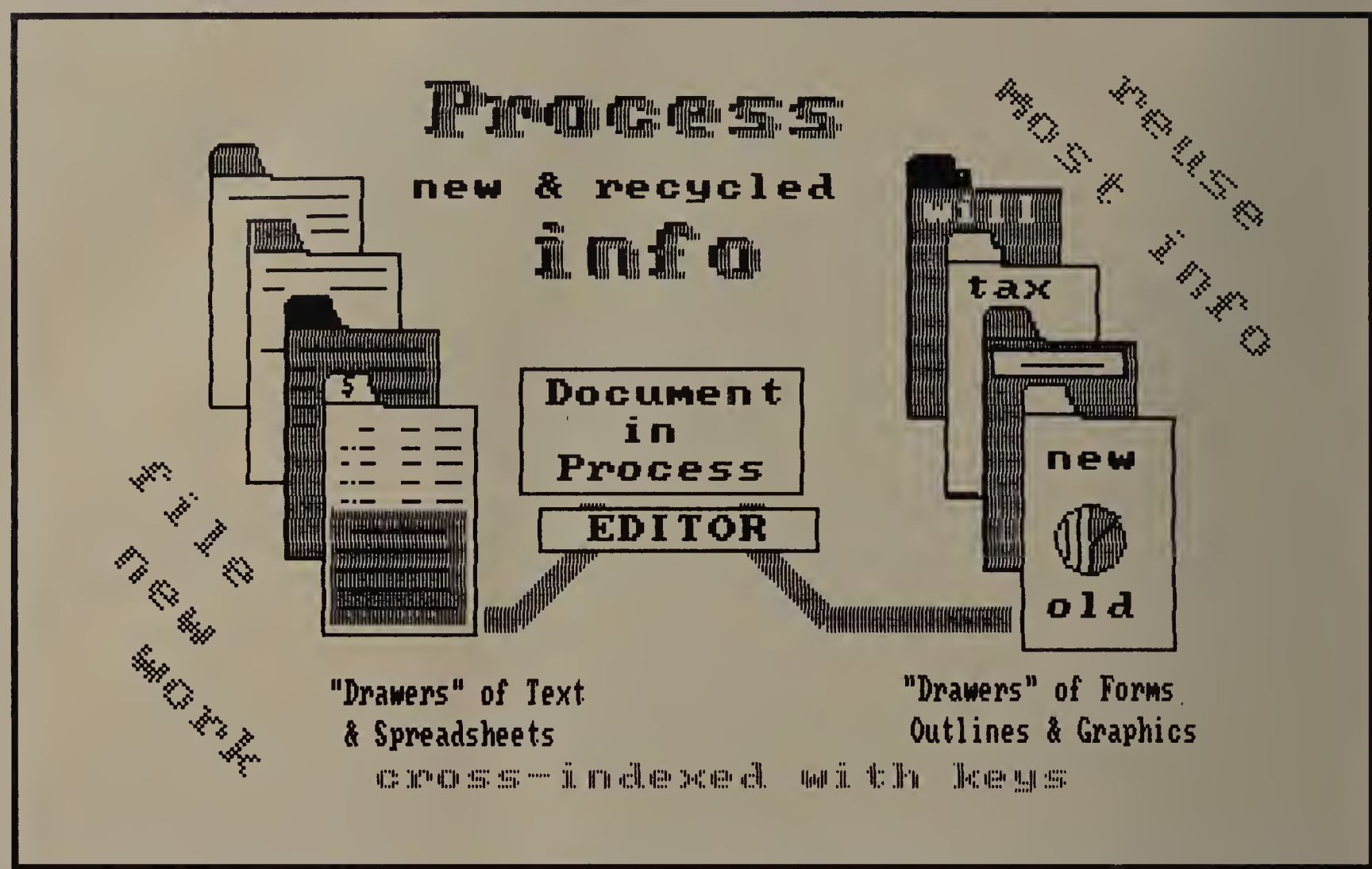


Figure 1: A conceptual picture of how The Idea Processor's Cardfile processes information (drawn with another Idea Ware program, The Grafix Idea)

reference or used as a document component. An important feature for lawyers is that these cards hold four to six pages of manuscript, long enough for most routine forms, model documents, clauses, or opinion summaries.

The next level up from the card is the drawer. Drawers are used to gather together cards and move them between cabinets. The highest level is the cabinet. A single cabinet used by a lawyer may contain a great variety of legal information.

You create the information retrieval system, picking key phrases meaningful to you in relation to your practice and changing them to reflect new focuses. Since every aspect of the system is tailored by and for you, it works as an extension of the way you think rather than as an arbitrary design created by someone else.

Accumulating Resources

Suppose you're an attorney suffering under an extreme caseload. Your secretary has been using a PC for a year now to type letters, draft legal documents, and perform other accounting and clerical duties. But you find that you are waiting too long for documents to come back to you, and as for the tough work of putting together the details of a case, you're still lost in paperwork. Your desk is covered with law books and the various word processed documents your secretary has generated.

You wait until your caseload drops to a manageable level so you can take the plunge into the computer age. You buy a PC with a hard disk, a modem, and a copy of *The Idea Processor.* Now all you have to do is get the information you need into the Cardfile.

The information will probably come from a variety of sources. You may want to download case summaries from a remote legal data base or buy forms on disk. However, most of your material will come from documents you already use in the office. If your office is not yet computerized, someone will either have to type the material in or use an optical character reader (OCR) to digitize printed text and convert it to disk files.

Your text data base of cabinets might contain information pertinent to each client, checklists, calendars of important dates, mailing lists, phone numbers, cover letters, and other form letters. An Estates cabinet might include case and statutory law, model wills or trusts, and sets of specific clauses that could be assembled for individual wills and trusts. It could also contain cards of data generated by spreadsheet programs or dedicated legal packages (such as estate analysis results). Other cards might contain affidavits, citations, opinion summaries, Shepardizations (which show related citations), AutoCite updates (from the AutoCite telecommunications data base), ALR (American Law Review) cross-references on similar cases, and blanks of forms required by estate executors and administrators. Separate cabinets can be created for the major categories of law, or you can create matter- and client-specific cabinets for big cases or major clients.

Searching by Keywords

To begin accumulating the resources needed to create boilerplate documents, you should learn the various options available for swapping material between the Editor, the Cardfile, and external DOS files. The transfers are fast and fairly easy to learn.

As you accumulate cards, you'll need a system to identify and retrieve them. Fortunately, the Cardfile was designed to do exactly that. Its menu displays an alphabetized list of all keywords in a cabinet when you type **L** (for List keys) and press <Enter> twice.

To get all cards from a cabinet, press **F** (for Fetch), then ~<**Enter**> when you are prompted for keywords. You can then press **N** (for Next) or **P** (for Previous) to rummage through the cards. This is usually the fastest way to find cards when a cabinet contains only a few entries.

Suppose you're working on a divorce case. To cross-reference clauses so you can examine them when assembling a document, key all form or model documents with descriptive titles (for example, Stipulation). Key the cards containing clauses for one type of form with the same phrase and add additional descriptive keywords (for example, Clauses and Parts). The main key (Stipulation) will bring up all Stipulation forms and all Stipulation Clauses and Stipulation Parts cards.

As you build resources in the Cardfile, you will need to use Boolean search logic (see "Searching in Circles") to find and combine the cards you want. The AND, OR, and NOT keys can be found on the Card Display menu when you press **S** (for Select). Then to use AND, OR, or NOT, you just press an **A**, **O**, or **N**, respectively. To reduce the first fetched set (all Stipulations) to the set of model or form divorce stipulations, plus the set of relevant clauses or parts that could be used, and to display the result, you type

F Stipulation <**Enter**>
S A Divorce <**Enter**> **O Clauses** <**Enter**> **A Divorce** <**Enter**> **D**

As you accumulate cards, you'll need a system to identify and retrieve them. Fortunately, the Cardfile was designed to do exactly that.

The Cardfile remembers a fetched set as you go back and forth to a document in the Editor; the set remains active until it is altered or you exit the program. The logic of the keyword search process is similar to that used by almost all the large "library" data bases, such as Bibliographic Research Service, Dialog Information Service, Lexis, and WestLaw.

Divorce, TDMS Style

Once you have developed a data base of cards containing forms, clauses, and other legal data, you can use the Cardfile's TDMS to organize the cards for inclusion into form documents. Figure 2 shows part of a sample model document, a retainer agreement for divorce proceedings. Figure 3 shows a series of related clauses kept on separate cards and brought together by keyword and Boolean searches.

For example, to bring together the cards in Figure 3, open the Family Law cabinet and choose the Fetch function. This brings you to the Card Display menu, where you choose the Select function and press

Searching in Circles

In the nineteenth century, mathematician George Boole devised an algebra to represent human thought, a construct he expounded in the book *Laws of Thought*. Another nineteenth-century mathematician, John Venn, devised a way of representing Boolean algebra with overlapping and nested circles and other closed curves. These figures, now called Venn diagrams, are often used in introductory symbolic logic courses. Both mathematicians thought of themselves as psychologists, clarifying how people think, or rather, should think.

The first substantial application of Boolean algebra was developed for electrical circuit design in the twentieth century. Later, Boolean algebra was, in effect, embodied in the arithmetic and logic units (ALUs) of the first and all subsequent computers.

With *The Idea Processor* and many on-line data base libraries, we seem to be coming full circle back to what Boole originally intended. These systems set up a method by which a user's ways of thinking about a subject can help assemble relevant sets of items.

In *The Idea Processor*'s Cardfile, cards have nothing intrinsically in common to group themselves into sets. The user assigns up to ten 14-character keywords to each card. Sets are constructed via the relations among these keywords, as shown in the Venn diagram in Figure A. The circles represent a conceptualization of classes, or sets of cards with common properties. A final work set is chosen based on classification properties determined by the Select command followed by either a keyword (which pulls all cards so keyed into the conceptual circle) or a sequence of keywords combined with AND, OR, or NOT functions.

Electronic library data bases, such as Dialog Information Service or WestLaw, use a more elaborate form of the technique found in *The Idea Processor*. In these large data bases, every word of manuscript copy is associated with an index and may function as a keyword for logical search combinations. Since a word-by-word search of massive data bases takes far too long even for fast mainframes, the selection statements must usually be applied within some sort of field structure.

Dialog's search process is quite similar to that of the Cardfile except that fields must also be specified. In addition, Dialog keeps a record of the search trail as selection sets are expanded and contracted by successive selection statements. WestLaw has tended to disguise the Boolean character of its search logic by such tactics as an "invisible OR."

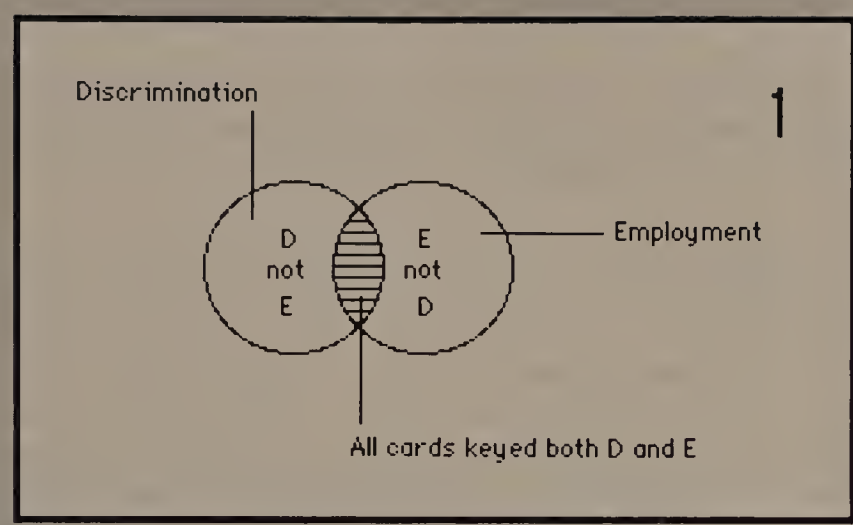
This general method of indexing and searching massive data bases is called the inverted files technique. Its main characteristic is that the index data is stored within the file that is indexed, along with the data. In *The Idea Processor*, pointers to index data (keys) for each Cardfile are found in

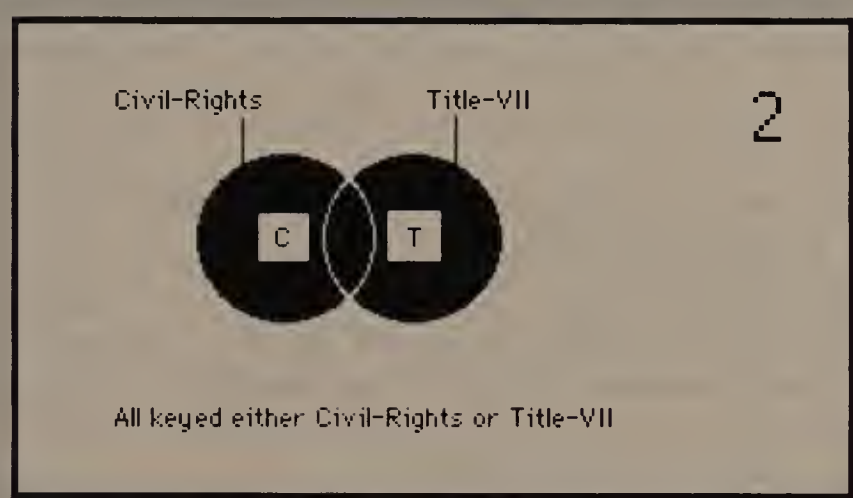
files named CABINETNAME .$<UN>IX. The keys themselves are scattered invisibly among the cards' text.

The Venn diagrams in Figure A represent a search done in a cabinet constructed to hold civil rights materials for litigation, complaints to hearings bodies, and workplace grievance resolutions. The patterns represent a work set construction for a client who has a possible Title VII claim (employment discrimination based on race or sex). The final set (the shaded circles and lune in part 3) might be reduced further if this happens to be a sex discrimination claim.

Sometimes it is better not to do too much fine-tuning with keys. Case law and most of the forms and regulations relating to job discrimination complaints are similar for discriminations alleged to be based on race or sex. A lawyer who wants to collect differential materials might add the keys Women, Blacks, and American Indians but would normally search only on the broader-based keys.

The main purpose of a TDMS is not to speedily locate individual records, although that is certainly one reason for using one. Effective use of the Cardfile is more a matter of defining (keying) and selecting, so as to pull everything relevant into the work set. Thus, the techniques of searching the Cardfile are not as important as developing a way of thinking about one's information assembly tasks in accord with Boole's *Laws of Thought.*





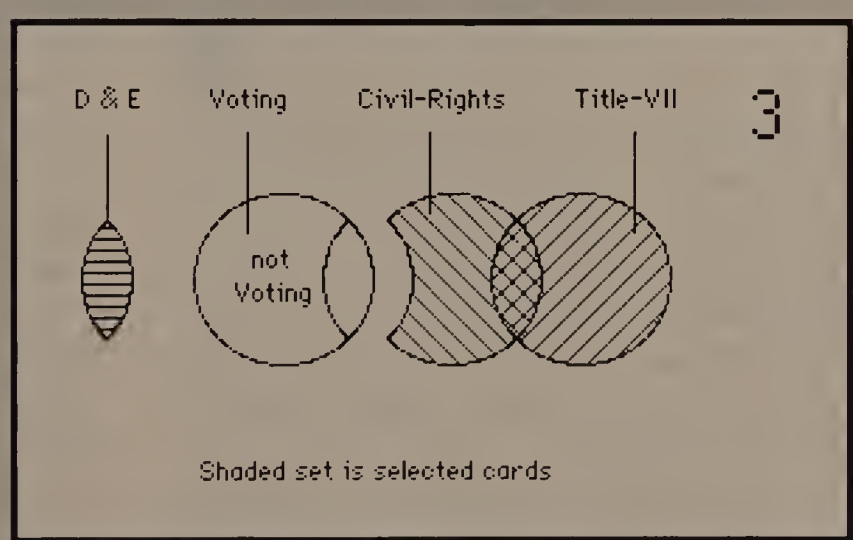


Figure A: Venn diagram showing Boolean search logic for a possible Title VII discrimination claim. In the first set, AND reduces the set to cards with both Discrimination and Employment keywords. In the second set, OR expands the set to all cards with either keyword. In the third search, NOT subtracts a set of cards that do not have the keyword Voting.

```
Keys:  AGREEMENT  LEGAL-SERVICES  DIVORCE

ATTORNEY'S RETAINER AGREEMENT
MARITAL DISSOLUTION

    AGREEMENT made @DATE between @CLIENTNAME, residing at
CLIENTADDRESS (Client) and @ATTORNEYNAME AND/OR FIRMNAME, with
offices at @FIRMADDRESS (Attorney).

   `nn. Retainer.  Client retains attorney to provide legal services in
connection with Client's marital problems.
   `n+. Nature of Services.  The services to be rendered by Attorney
under this Agreement are specified here:
   `n+.  Counsel and Advice.  Legal counsel and advice on all matters
relating to Client's present marital problems.
   `n+.  Litigation.  If judicial action is taken by Client or Client's
spouse, Attorney shall take all steps to adequately represent Client,
including but not limited to, preparation, service, and filing of all
necessary documents, conduct of all necessary pre-trial procedures,
preparation and defense of all pre-trial motions, participation in all pre-
trial conferences, and the conduct of the trial or other judicial action.
```

Figure 2: A sample model document of a retainer agreement for a divorce case. Optional clauses (shown in Figure 3) can be searched for and included in the agreement. The @ acts as a prompt for keyboard input. The 'nn is a format command for automatically renumbering clauses.

L. You can now search for all cards previously labeled Agreement AND Divorce. The addition of AND Legal Services to the search set will eliminate all but model documents and potential parts pertaining to such an agreement between counsel and a marital dissolution client. But if NOT Legal Services is used instead, it will eliminate those models and clause cards, leaving only sets appropriate for agreements between divorcing spouses.

Once you have gathered together your library of clauses (Figure 3), you can copy your agreement model into the Editor (Figure 1) and begin reading in clauses from the Cardfile.

The model document in Figure 2 also takes advantage of *The Idea Processor*'s independent counter, the command 'nn. When the first numbered item is set to 'nn, the printed document will have all 'n+ clauses numbered in correct sequence, starting with 1 for 'nn. Thus, bringing in a new clause from the Cardfile won't disrupt the numbering of the other clauses. The character @ is arbitrarily used as a search target that prompts the user to add information from the keyboard. (Any other seldom-used character works just as well.) The combination of a library of selectable modules and quick replacement of variables makes rapid and accurate final assembly and printing possible.

Your library of clauses doesn't have to be on separate cards; they can be block-marked and transferred to the agreement being worked on. Similar libraries of models and clauses can be created for contracts, stipulations, incorporations, applications, and standard portions of allegations. Judgment and skill in drafting are still essential; selecting and sequencing components and determining the exact wording to fit the client's circumstances are professional, not clerical, tasks.

Importing Graphics and Spreadsheets

Many lawyers use spreadsheet packages such as Lotus Development Corporation's *1-2-3* to do "what if" analysis on potential family support payments, annuity-type ("structured") liability settlements, and demonstrations of injury-caused changes in family income and life-style. The results of such analyses can be stored to disk from *1-2-3* as a .PRN file and read

```
Keys:  AGREEMENT  LEGAL-SERVICES  CLAUSES  DIVORCE

   `n+. Client's Responsibility for Fees.  Client's spouse may be liable
for the payment of Attorney's fees and if so, Attorney will make every
reasonable effort to collect the fees from Client's spouse.  Nevertheless,
Client is primarily liable for the payment of Attorney's fees.  Any award
of fees by a court to be paid by someone other than Client shall not
relieve Client of that liability.  Payment of any part of Attorney's fees
to Attorney by a third party shall be credited against amounts owed by
Client to Attorney.  If there is any credit balance in Client's account
following full payment of all fees and of the sums described in Paragraph
@, Attorney will remit the balance to Client.
   `n+. Additional Expenses Not Included in Fee.  The fees described in
Paragraphs @ include all of Attorney's expenses, including office overhead
and secretarial, clerical, and the assistance of law clerks and associates,
but these fees do not include charges for long-distance phone calls,
travel, and out of pocket expenses, such as investigators' fees or filing
charges.  These charges and expenses shall be re-imbursed by Client upon
receipt of a statement itemizing them.  Attorney will not incur any
individual charges in excess of @EXPENSELIMIT without first securing
Client's consent.
   n+. Fee If No Suit Started.  If no suit is started in connection
with Client's marital problems, a fee of @$ATTYBILLRATE per hour will
be charged for all time spent by Attorney in connection with Client's
marital problems, including time spent on legal research, consultation with
Client, conferences with Client's spouse or people representing Client's
spouse, telephone conferences, preparation of letters and documents, and
traveling.
```

Figure 3: Sample clauses collected by keyword and Boolean search logic in the Cardfile. These clauses can easily be read into the model document in Figure 2.

into *The Idea Processor*'s Cardfile for reference and incorporation into documents by pressing <**Alt**>-<**F4**> when you are in a new blank card.

If you want to incorporate graphics created on *1-2-3* or other graphics programs, load *The Idea Processor*'s SAVSCRN utility before loading the graphics program. When you come to the desired screen, press <**Shift**>-<**PrtSc**> to save the graph in the proper format. Graphs can be loaded into the Cardfile and printed individually or alongside text and tabular material.

Graphics can be useful for analysis of complex legal data or for demonstrating a legal point. For example, you can create a pie chart to show the tax consequences and actual spendable income for both parties to a divorce under various spousal support plans.

Of Time and Macros

A lawyer's day is often filled with interruptions that create delays and destroy concentration. Fortunately, *The Idea Processor*'s macro capability enables you to create fast-access cards for time billing and scheduling to help you in day-to-day organization. If you're interrupted by a phone call while drafting a report, you can promptly display a daily time card and record the time spent on that billable call. You can also quickly consult a calendar card to make appointments or reference addresses, phone numbers, and comments on client cards.

The following procedure shows how to make the time-card macro; the procedures are similar for any quick-reference card. First, go to the Cardfile menu and make a new card. Type your name or initials on the top margin of the card and include the categories shown in Figure 4. After storing the card, assign it the keyword **Timecard.**

```
Cabinet Open:  pgfirst                                  Card Display: 1 of 1
Keys timeslip

DAILY TIMESLIP 08-16-84
Attorney:  Dudley DoRight

Billrate code reminders:  DD20=Federal CJA contract; DD100=standard;
DD180=in-court hours; DD150=out-of-town; DD300=fat cat.


CLIENT          BILLCODE    TIME         TASK DESCRIPTION

DoexJo           DD100       15 min      TC, probation officer
CityCo           DD100       10 min      TC, Mayor Brown, reminder of hearing.
NatReal          DD300       4 hrs       Draft new industrial districts loan
                                         development policy, agreements
WilsAM           DD300       25 min      TC, Discussion of upcoming deposition
                                         reminder of discussions re documents.
                                         Oral listing from client of documents
                                         he will bring.


Fetch  Next  Prev  Select  Edit  Add key  Delete  Graph  Type  Cardfile  Return

Drawers:  pgfirst
```

Figure 4: Sample time card for billing to particular cases. The Idea Processor's macro capability enables you to display a time card for billing piecemeal work such as phone calls.

Now return to the Editor and set up a macro that will allow you to immediately access the time card. Start the macro definition process by pressing <**Alt**>-**D** and answering yes to the prompt, 'Do you want to save this macro?' Press <**Ctrl**>-**D** to begin defining the macro.

You will be prompted for a number, which will become the name of the macro. Type **0**; the prompt 'Defining Macro 0' will appear on the top of the screen. Now every keystroke entered will be recorded as part of the macro.

The time-card macro should record the following process: move from the current document to the Cardfile, select 'Timecard', open the card for entry of new data, and jump to the end of the card. To accomplish this series, begin by typing <**Alt**>-<**F10**>, to move to the Cardfile. Then press **F** (for Fetch) and answer the keyword prompt by typing **Timecard** <**Enter**>. Your newly created Timecard should appear. Press **E** (for Edit) to open the card, and press <**Ctrl**>-<**PgDn**> to jump to the end of the time entries already present. Now close the macro definition with <**Ctrl**>-**D**. You should hear a brief whir as this definition is written to the file IDP.$<UN>MC. This file can hold ten 100-character macros, invoked by <**Ctrl**>-**0** through <**Ctrl**>-**9**.

Return to the Editor by saving Timecard with <**Alt**>-<**F6**> and pressing **R** (for Return) after the main cardfile menu appears. Press <**Ctrl**>-**0** to test Macro 0. Remember to always leave Timecard and return to your document by pressing <**Alt**>-<**F6**>. If you use <**Alt**>-<**F10**>, your new time entry won't be saved.

The time card should be printed at the end of each day, given to a billing clerk, and updated. To do this from the Cardfile menu, type **F Timecard** and press <Enter>. From the Card Display menu, press **T** (for Type) to print the card. To save the old time record and create a new one, save the file with <**Alt**>-<**F6**> and press **A** to add a new keyword. As prompted, add the key **Timecard-01-16** (for current date). This new keyword now appears at the top of the screen, but the old keyword is still highlighted as the active key. Press **D** (for Delete) from the Cardfile menu. You'll be asked whether you want to delete the key 'Timecard'; answer yes. That key now disappears from yesterday's time card, whose only key now indicates its date. Finally, make a new card keyed **Timecard**, your card for the next day. To avoid retyping and reformatting the time card, you can copy the top part of "Timecard-01-16" and send it to the Editor. In the Editor you can copy the block back to your new Timecard.

You can survey all your time records by pressing **F**. When prompted for the keys, enter **Time~**, using the tilde wild-card character. This entry brings up all time cards, ordered by date with the current card first. You can look at all time cards in daily order for the month of January by keying **Timecard-01~**. A fetched set can be flipped through by pressing **N** and **P**.

Using the Cardfile is more than clerical boilerplate assembly; it is an aid to drafting. The Idea Processor *can help you improve the quality of your work, not just the speed.*

Other automatic utilities do not require so much maintenance. Normally, you can maintain notes and schedule cards by block marking obsolete material and deleting it with <**Ctrl**>-<**F8**>.

The Idea Processor's macros can also store and recall commonly used style formats, signature blocks for letters or pleadings, captions for court documents, and short notary statements. When you include formats in a macro, open the macro as usual and then press <F3> to call the pop-up format menu, where you must type in each value. Headers, footers, and some extra space for a letterhead can be entered before the macro is closed. Finally, press <End> to return to the Editor.

A Lever of Knowledge

The Idea Processor amplifies a lawyer's knowledge, judgment, and craft in selecting, modifying, and ordering parts from a custom-made library. Using the Cardfile is more than clerical boilerplate assembly; it is an aid to drafting. Good lawyers can increase their leverage from the program by storing and referencing their past work and becoming adept in mustering everything relevant to the matter at hand. The text data management system employed in *The Idea Processor* can help you improve the quality of your work, not just the speed.

For knowledge workers, personal computers represent the opposite of office automation. They provide aids to working more intelligently, rather than breaking tasks down into automated routines that can be done without thought.

Paula Giese is president of CompuLex Services, a Minneapolis consulting firm specializing in information services and computer consulting and installation for law firms.

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Well-Chosen Words

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Robert E. Gruber and Susan Gruber

Microsoft Word is a boon to word manipulators of all stripes. It combines advanced features and helpful utility programs into a relatively simple-to-use package. One notable utility included with version 1.1 of *Word* is Print Merge. Similar to *WordStar*'s kissing cousin *MailMerge* but more powerful, Print Merge makes it easy to produce everything from personalized form letters and contracts to market survey questionnaires and final examinations.

Like other merge programs, Print Merge can merge a generic letter with a file of customer names, addresses, and so on to produce personalized letters. What takes Print Merge beyond the scope of most mail merge programs is its clever use of programming-like conditional statements. You don't have to be a programmer to use Print Merge, but with a few simple statements you can create documents that will select from any number of factors you define, such as customer age, marital status, income, or sex. The result is letters and other documents that practically pick their contents.

A Merging Letter

The words "personalized" and "form letter" may at first seem mutually exclusive. But combining a form letter at print time with text that varies from letter to letter does indeed produce personalized form letters. The variable text can be almost anything, though obvious choices are a customer's name, street address, city, state, and zip code and a salutation. Less obvious but useful nonetheless might be an exact description of a customer's most recent purchase. As you'll see, an extra personal touch can be created by omitting certain phrases, sentences, or paragraphs in some letters and including them in others.

To illustrate some of Print Merge's many features, let's assume a politician is preparing a thank-you letter for his varied campaign contributors. His first step is to write a form letter with *Word* (see Figure 1). Scattered throughout the form letter are special fields marked by double angle brackets (<< >>), produced by pressing **Ctrl-[** and then **Ctrl-]**. The angle brackets tell *Word* where to insert variable data when printing a letter. For example, the <<city>> field in the first letter might be filled in with "Denver," in the next letter with "San Diego," and so on.

```
<<DATA Header.doc,Datafile.doc>>
<<SET date=?>>

<<date>>

<<firstname>> <<lastname>>
<<street>>
<<city>>, <<state>> <<zip>>

Dear <<firstname>>,

Thank you for responding to our recent

survey and, especially, for your

campaign contribution of

<<contribution>>. I wish to make one

point perfectly clear.  I believe rich

folks are <<IF contribution <1000>>not

paying<<ELSE>>paying more than

<<ENDIF>>their fair share of taxes, and

if elected I intend to do something

about it!


What's more, here is where I stand on

the "gender gap." <<IF

gender="female">><<INCLUDE

Documntl.Doc>><<ELSE>><<INCLUDE

Documnt2.Doc>> <<ENDIF>>

Thank you again for your support. In

closing, let me leave you with this

message: <<INCLUDE Documnt3.Doc>>

Sincerely,


Horace Puffwhistle
Future Senator-Elect
```

Variable data is stored in standard *Word* document files. In Figure 2, two files are used: a header file, which lists the field names (firstname,lastname, . . .); and a data file, which stores the values for each field (Anne,Berg, . . .). When you create a header or a data file, fields and data must be separated by either a comma or a tab character. (In some cases it may be more convenient to create a data file in column form–hence *Word*'s use of the tab character.) If a comma appears within a field, the field must be enclosed within double quotation marks. The variable data fields in a record must match the order of the field names defined in the header file; a record must end with a hard carriage return. *Word* is rather generous when it comes to record size: a field can contain as many as 64 characters, and a record can hold up to 256 fields. Since a *Word* record can theoretically be over 16,000 characters long, the program allows you to word wrap a record–something most merge programs do not permit.

How does *Word* find this variable data? Instructions are given in the form of a data statement, which must be the first instruction in the main document. In Figure 1, the '<<DATA Header.doc, Datafile.doc>>' statement tells *Word* that the necessary informa-

Figure 1: A Word form letter. This main document is merged with other files to produce personalized form letters. The bracketed fields are filled with data from another file; in some cases, what's printed depends on the IF . . . ELSE condition stored in the field.

```
                    Header.doc

firstname,lastname,street,city,state,zip,contribution,gender,age

                    ------------------------

                    Datafile.doc

Anne,Berg,12 Main Road,Denver,CO.,80228,25,female,4

Beth,VanHalleran,1460 Mont St.,San Diego,CA.,92116,150, female,2

Carolyn,Smith,842 Saratoga Avenue,Denver,CO.,80224,1500,female,3

      .              .

      .              .

      .              .

George,Corporado,137 45th Street,New York,NY,10024,4000,male,2
```

Figure 2: Header.doc and Datafile.doc work closely together in a print merge. Header.doc lists the field names, while Datafile.doc defines the field values for each record. As in other merge programs, certain rules of punctuation must be observed.

tion is in two disk files labeled Header.doc and Datafile.doc (see Figure 2). '<<SET date = ?>>' instructs *Word* to ask the user before printing starts for data common to all the letters, namely, the current date. Name, address, and contribution fields are filled with text taken from Datafile.doc.

Since the main document contains all necessary references, running Print Merge is simple. Open the main document file, leave the edit mode with <Esc>, and press **P** and **M** to start the merge. You can pause the printing session by pressing <Esc>. You can then restart it by pressing **Y** or stop the session by pressing <Esc> again.

For our hypothetical politician, the power of Print Merge's conditional statements is particularly helpful when a letter must satisfy contributors of both sexes and differing incomes and points of view. Print Merge produces four variations on the politician's theme. Two versions of the letter are aimed at affluent male and female voters who have contributed more than $1000; the other two target men and women presumed to be further down the economic ladder. The slant of each letter shifts as Print Merge takes into account the contributor's sex and assumed income, based on the size of the contribution.

This individual molding of each letter is the result of the conditional statements placed in the form letter. In the second paragraph of the letter in Figure 1, the IF . . . ELSE . . . ENDIF statement inserts an indignant phrase that depends on the size of the contribution. If the donation is over $1000, the letter thunders that rich people "are paying more than their fair share of taxes" (see Figure 3);

Fields marked by angle brackets tell Word *where to insert variable data when printing a letter.*

June 21, 1985

Carolyn Smith
842 Saratoga Avenue
Denver, CO 80224

Dear Carolyn,

Thank you for responding to our recent survey and, especially, for your campaign contribution of $1500. I wish to make one point perfectly clear. I believe rich folks are paying more than their fair share of taxes, and if elected I intend to do something about it!

What's more, here is where I stand on the "gender gap." Women deserve equal pay for equal work.

Thank you again for your support. In closing, let me leave you with this message: On primary day vote early—and often.

Sincerely,

Horace Puffwhistle
Future Senator-Elect

Figure 3: A completed Print Merge letter addressed to an affluent female contributor

a smaller contribution satisfying the 'IF contribution <1000' condition elicits an everyman phrase chiding the rich for not paying enough. Likewise, the third paragraph transforms itself depending on the sex of the contributor. If the money comes from a woman, an Include instruction inserts an appropriately feminist phrase kept in the Documnt1.doc file; if not, a decidedly nonfeminist phrase is fetched from a file labeled Documnt2.doc.

The last paragraph of the letter ends with "On primary day vote early—and often," a phrase held in a third file, Documnt3.doc. This file, like the others referenced by an Include instruction, can be quickly and separately revised; the main document remains unchanged. For example, the word "primary" could easily be changed to "election" when voting time rolls around.

Chances are you won't be running for office. But if you use *Word* in marketing, sales, or related business work, Print Merge can save you time and keep your current—and potential—customers pleased with your personal service.

Whittling Down Data

Before you can merge data with text, you must acquire or process the data first. If a data file is created with *Word*, you need worry only about its format. If data—mailing lists, tables, and other information—is prepared by other programs, have no fear. Print Merge works with any ASCII data files or the ASCII output of data base management programs such as *dBASE II*. (*Word*'s user manual provides ample instructions for preparing *dBASE II* files.) The rules for using this data in a merge are the same as those for using a *Word* data file: commas or tab characters must separate the fields, and variable data must follow the order of the variable names in the header file.

Of course, you may not want to use an entire data file for a merge. Certainly, the larger the file, the longer merging takes. If only 8000 records are needed from a file holding 80,000, a merge can take forever as *Word* dutifully trudges through the file searching for the right records. Whittling a data file down to size can be done in several ways. You could use a data management program such as *dBASE II* to select the records needed for a merge. But this would involve converting the *Word* file into *dBASE II*'s format and then back into an ASCII format for *Word*.

However, a simple and, for those who don't own *dBASE II*, cheap way to create subsets of a file is by using DOS 2.00's FIND command. At DOS's A> prompt, you issue **FIND** followed by a field common to the records you want, the original file's name and disk drive, and the new file's name and drive location. For example, to select female clients from a large data file (Customer.doc) and to copy this subset to a separate file (Femcust.doc), you would type **FIND "female" b:Customer.doc >b:Femcust.doc** and press <Enter>. (The < and > signs are redirection indicators that mean respectively "get the input from" and "send the result to" in a DOS command statement.)

List.doc datafile

firstname	lastname	income	gender	age class
Anderson	Ferderber	20000	female	4
Alan	Wiggins	40000	male	2
Fred	Crolish	35000	male	3
Donna	Dolittle	19000	female	2
Dick	Sampson	60000	male	4
Carl	Gustafson	25000	male	2
Dan	Weirs	22000	male	3
Judith	Green	35000	female	2

Figure 4: List.doc, a customer data file. Note that this file includes not only data but also header information in the form of column headings.

```
<<DATA List.doc>>

<<IF age=2>><<IF income >30000>><<IF gender="female">>

Dear Ms. <<lastname>>,

Young professional women like yourself...<<ELSE>>

Dear Mr. <<lastname>>,

Young professional men like yourself...<<ENDIF>>

                                        Yours truly,<<ENDIF>><<ENDIF>>
```

Figure 5: A sample form letter using nested IF statements. List.doc is the letter's source of variable data. Only those records in List.doc that meet the conditions laid down in the nested IF statements are selected and merged.

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Table 1: Printing checklist

Command	Command Field	Setting
Print Options[1]	Printer	Enter the .PRD file name corresponding to your printer, e.g., IBMGRAPH
	Draft	No
Format Division	Pg #	Yes/No
	Numbering	As desired
	Footnotes	Same page or end (of document) as desired[2]
Print Repaginate[3]	None	None
Format Paragraph	Keep[4]	Yes

[1]Print Options settings from the previous editing session remain in effect until changed.
[2]Footnote location affects page breaks.
[3]This command enables the user to review page breaks before a document is printed. Should pages break in the middle of a list or at some other undesired point, use the Keep option described below.
[4]Setting Keep to Yes will print a formatted paragraph in its entirety on one page. Keep affects subsequent page breaks, so repeat Print Repaginate and keep other paragraphs throughout the document.

You can extend the process to produce successively narrower subsets. For example, to select only those women in Femcust.doc living in Denver you would type: **FIND "Denver" b:Femcust.doc >b:Denver.doc**. FIND will also calculate how many records contain a particular field. **FIND/C "Denver" <b:Femlist.doc** produces a number that can be used to estimate how much disk space Denver.doc might require, the time needed to merge print the file, or even how much printer paper you'll need.

IFs and Buts

Although FIND is easy to use, creating a subset clutters up the disk with essentially useless intermediate files. But *Word*'s conditional statements (IF, ELSE, ENDIF) misleadingly suggest a potential solution that could produce the same result with no clutter. Programmers often refine a process by placing IF statements within one another in a structured way. This nested IF structure could be similarly applied to *Word*'s conditional statements to whittle down a file into a subset at print time. Since *Word* would have to search a data file for records meeting the IF conditions, a print merge performed on a large file would undoubtedly be slow.

Using nested IFs with *Word* can be useful in any number of business situations. For example, a department store with a master cus-

tomer file (see Figure 4) wants to send a catalog only to those customers in their twenties who make over $30,000 a year. Further, male and female customers must be distinguished so that letters can be appropriately addressed (see Figure 5).

Unfortunately, the nested IFs shown in Figure 5 don't quite work. The instruction '<<IF age=2>><<IF income >30000>><<IF gender="female">>' does indeed single out Alan and Judith in List.doc—the only individuals who satisfy both age and income requirements—but there is one drawback that renders the technique useless for files with many records that don't satisfy the given IF conditions. *Word* advances a page for every record, whether a letter is printed or not. In this example, six unused sheets of paper emerge from the printer, along with letters to Alan and Judith. So the IF statements in *Word* can't really be equated with those used in programming languages. When contacted, Microsoft had no fix for this problem, but one may be forthcoming in future versions of *Word*.

One rule to follow: when using IF statements in *Word*, remember that the number of IFs and ENDIFs must match. Two IFs require two ENDIFs; three IFs, three ENDIFS; and so on—otherwise the instruction will not execute.

When using IF statements in Word, *remember that the number of IFs and ENDIFs must match: otherwise the instruction will not execute.*

The Word Boilerplate

Word's Include instruction is by no means confined to folding brief phrases into form letters. Standard clauses, whole documents, or tables can be incorporated into a document using Include. You can merge large documents and exhibits into an existing file or form a new one in the process. In the latter case, the main document is not unlike a *MailMerge* command file, for it merely contains a few instructions, such as:

<<Include Section1.doc>>
<<Include Section2.doc>>
<<Include C:Section3.doc>>

Note that drive B: does not have to be designated; *Word* automatically assumes it is the default drive unless told otherwise. However, keep in mind that if a needed file is incorrectly referenced or not present at the time of a print merge, the resulting document will be incomplete. For example, if Section1.doc was actually on drive C:, running Print Merge would elicit a 'not a valid file' error message, and printing would continue—minus Section1.doc. To avoid double headaches, make sure you also check documents for proper page layouts, paragraph formats, and character formats (see Table 1).

Word is a powerful word processing tool, particularly with the inclusion of Print Merge. Some uses of conditional statements and DOS already yield interesting results. With a little ingenuity, other DOS utilities such as SORT can be used to process data files for your own particular applications. In truth, mergers have never been easier.

Dr. Robert E. Gruber, a former assistant professor of marketing, is a consultant specializing in strategic management. He is currently writing a textbook on corporate strategy and is collaborating on a business strategy evaluation program for the PC. Susan Gruber is a computer consultant and chemist who recently worked at the Research Institute of Scripps Clinic in La Jolla, California.

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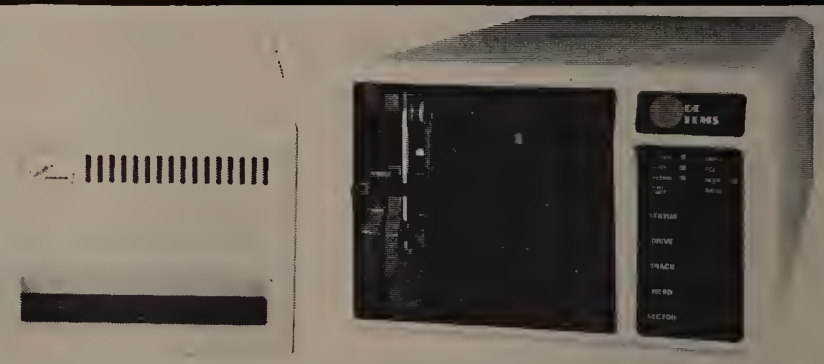

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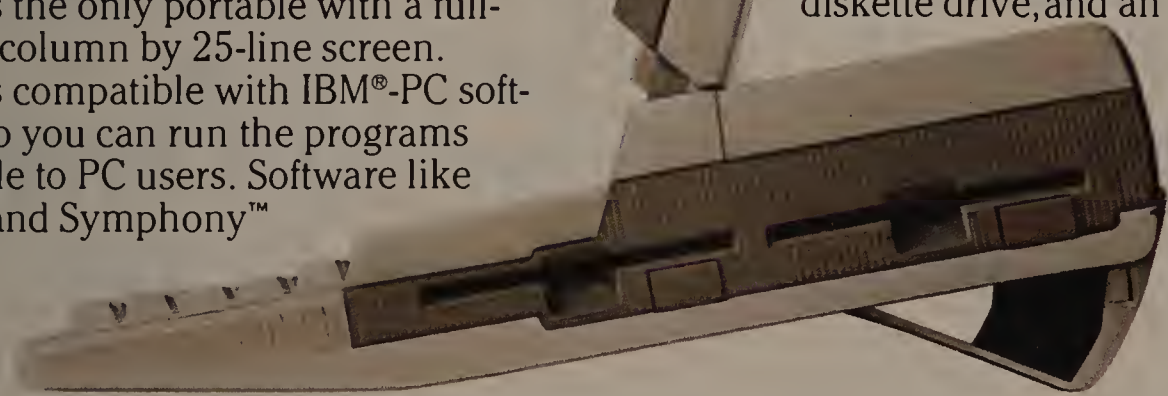

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Readers' tips this month include cures for Compaq hang-ups and XT parking problems, finding lost files, using 1-2-3 with subdirectories, coloring high-resolution graphics, squeezing dates onto disks, and tips for DEBUG devotees.

Edited by Steven Cook

Reader Gary Gordon of Woodinville, Washington, advises that users of Kent Quirk's patch to GRAPHICS.COM (see "Gemini Graphics," *.*, *PCW*, Vol. 2, No. 10) should also include the DEBUG command **E 0250 18** to reset the printer to normal line spacing after a graphics printout. Several readers have written in to point out that DOS 2.00 and later versions support keyboard redefinition that can be used to emulate a Dvorak Simplified Keyboard. Unfortunately, that technique does not function with most programs, including BASIC.

Paper Clip Fix

I too have experienced the problem that occurs when the <Shift>-<PrtSc> sequence is pressed on a Compaq portable computer when no printer is attached ["Compaq and <Shift>-<PrtSc>," *The Help Screen, PCW*, Vol. 2, No. 7]. The Compaq becomes hopelessly locked up waiting for a printer, and if one is not available (as is often the case with a portable computer), the only way out is to turn the power off and lose whatever data may have been in memory.

The software solution suggested in *The Help Screen* works fine but must be applied in advance of the problem. It can't help you when, for whatever reason, you suddenly find out that you are about to lose 4 hours of work to a locked-up computer.

My solution attacks the problem at its source—the printer-busy signal. When the computer gets locked up, simply connect pin number 11 of the parallel printer port to ground. The computer then thinks that a printer is connected, and processing continues normally. If you look at the parallel printer port on the Compaq, you will see that it has 25 pins and that each one is numbered. Pins 18 through 25 are all ground pins, any of which can be connected to pin 11 to unlock the system. In an emergency you can use a paper clip.

I rigged up a simple jumper plug using a male DB-25 connector with wire-wrap leads. I cut off all the leads except numbers 11 and 23, which I soldered together and trimmed flush. I then coated the exposed ends with silicon rubber bathtub sealer, and the whole thing fits under the door that covers the Compaq's connectors for travel. I leave the connector installed whenever my computer is not connected to a printer, and I no longer lose data due to Print Screen lockup.

Paul Kucharski
Franklin, Wisconsin

Editor's note: Newer Compaqs time out and return control to the operator when a printer is not connected.

Parking Problem

I recently typed DIR on my PC XT and heard a "ping-ping-ping" sound coming from the hard disk. As it turned out, someone had moved the XT without first parking the disk drive heads, resulting in permanent damage.

The IBM Diagnostics disk that comes with the XT makes parking the heads easy: simply place the floppy disk in the drive, start the system, and choose item 3, 'Prepare System for Relocation', from the menu that appears on the

screen. Unfortunately, the routine does not reside on the hard disk, so it is not readily accessible to the casual user. According to Murphy's Law, the likelihood of head parking is inversely proportional to the number of steps involved.

Although the people at my computer store told me that I couldn't put the head-parking routine on the hard disk, the $800 repair bill inspired me to do it anyway.

Make a subdirectory on the hard disk called DIAGS with the command **MD C:\DIAGS**. You must place the routine in its own subdirectory, because it requires a special version of COMMAND .COM.

Next, change directories with the command **CD C:\DIAGS**, then place the IBM Diagnostics disk in the floppy drive and copy COMMAND.COM and SHIPDISK.COM onto the hard disk. The other files on the Diagnostics disk are not required for head parking.

Create a batch file in the root directory (see PARK.BAT). The TYPE and PAUSE commands shown in the batch file are optional. I use them to display the text of a file called PARK.TXT that provides some instructions to the user.

To use the routine, make sure you are in the root directory, then type **PARK**. When the Diagnostics menu appears, type **3** <**Enter**>. When the message 'SYSTEM READY FOR RELOCATION' followed by the Diagnostics menu appears, the heads will be parked, and you should turn off the computer. Do not type any commands until you turn off the system, or you will unpark the heads.

```
C>COPY CON: PARK.BAT
ECHO OFF
CD \DIAGS
TYPE PARK.TXT
PAUSE
COMMAND
<F6>
```

PARK.BAT

```
A>COPY CON: LOTUS.BAT
ECHO OFF
COPY %1.CNF 123.CNF >NUL
LOTUSX
COPY 123X.CNF 123.CNF >NUL
<F6>
```

LOTUS.BAT

Guy Zumpetta
Streetsboro, Ohio

Editor's note: You may want to change the name of the COMMAND.COM file copied from the Diagnostics disk to avoid confusing it with DOS's COMMAND.COM. If you do, be sure to revise the batch file with the new name.

File Finder

With over 500 files in 21 subdirectories on my hard disk, I frequently forget where any particular file is located. I use the command **CHKDSK /V ¦ FIND** *filename.ext* to track them down. When CHKDSK is invoked with the /V option, it lists all the files with their directory names in uppercase letters. By piping the output to the DOS filter FIND instead of to the screen, I can search for any file (by placing the file name and the extension in uppercase letters between the double quotation marks) or group of files (by placing just an extension in uppercase letters between the double quotation marks), or list portions of the directory tree (by placing the name of the directory in uppercase letters between the double marks). And the output can be redirected to the printer by appending the characters >**PRN**.

Jim Weisz
Lombard, Illinois

Editor's note: CHKDSK.COM and FIND.EXE must be in the current directory of the default drive or in a directory available via PATH. Also, you can save

yourself a few keystrokes by creating the following one-line batch file (called LOCATE.BAT):

CHKDSK /V ¦ FIND "%1"

Now you can just type **LOCATE** string, *where* string *is the file(s), extension, or directory you want to find. You must still enter* string *in uppercase letters but without the double quotation marks.*

Automatic 1-2-3 Subdirectories

As an avid *1-2-3* user, I like the fact that I can tailor the default settings to my needs. A problem arises, however, because I use a hard disk with worksheet files located in a number of different subdirectories. It's inconvenient to issue commands to change the default directory each time I use the program, so I have developed a batch file to do it for me.

Suppose that *1-2-3* is stored in the subdirectory \LOTUS and that I have worksheet files in the subdirectories \WP, \WP\BUDGET, and \PRODUCT\FORECAST. First copy the file 123.CNF to 123X.CNF and then run *1-2-3*. Issue the command */Worksheet Global Default Directory,* type in the name of a subdirectory in which you have worksheet files, and then issue the Update command. Exit *1-2-3* and copy the file 123.CNF to a file whose name reflects the subdirectory name you just entered but ends with .CNF, such as BUDGET.CNF. Repeat these steps for each subdirectory, as needed.

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Rename the file LOTUS.COM as LOTUSX.COM. Then create a batch file as shown in LOTUS.BAT. To use the batch file, type LOTUS followed by the name you assigned to the .CNF file that corresponds to the subdirectory you desire, such as **LOTUS BUDGET**. If you don't specify a subdirectory, the original default directory stored in 123X.CNF will be used.

Joel Borden
Cupertino, California

Printer Check Revisited

The technique described in the item "Easy Printer Check" [*.*, *PCW*, Vol. 2, No. 10] works fine if you have an IBM Monochrome Display and Printer Adapter, but it will not work if you have the Parallel Printer Adapter.

According to the IBM Technical Reference manual, port number 957 (3BC hexadecimal) contains the printer status only if you have the IBM Monochrome Display and Printer Adapter. Port number 889 (379 hexadecimal) contains the printer status if you have the Parallel Printer Adapter.

If you have the Parallel Printer Adapter, line 1000 of PRINTCK .BAS should read **1000 IF INP(889)=223 THEN 1040.**

Scott Murphy
La Center, Washington

Editor's note: You should test the printer status for both adapters to ensure that your programs will run on all PC configurations. Because these techniques are hardware dependent, they may not work with every hardware configuration.

Colorful Tip

If you want to display a high-resolution graphics image in color, use the command **OUT 985,** *colornum*, where *colornum* is the number of the desired color. For example, the command **SCREEN 2:OUT 985, 14** changes everything on the screen to yellow, as yellow is color number 14.

Note that this changes the foreground color; the background remains black. The command does not require DEF SEG, because no PEEKing or POKEing is involved. The OUT command can be used to change colors as often as needed.

Eric Hedstrom
Pleasanton, California

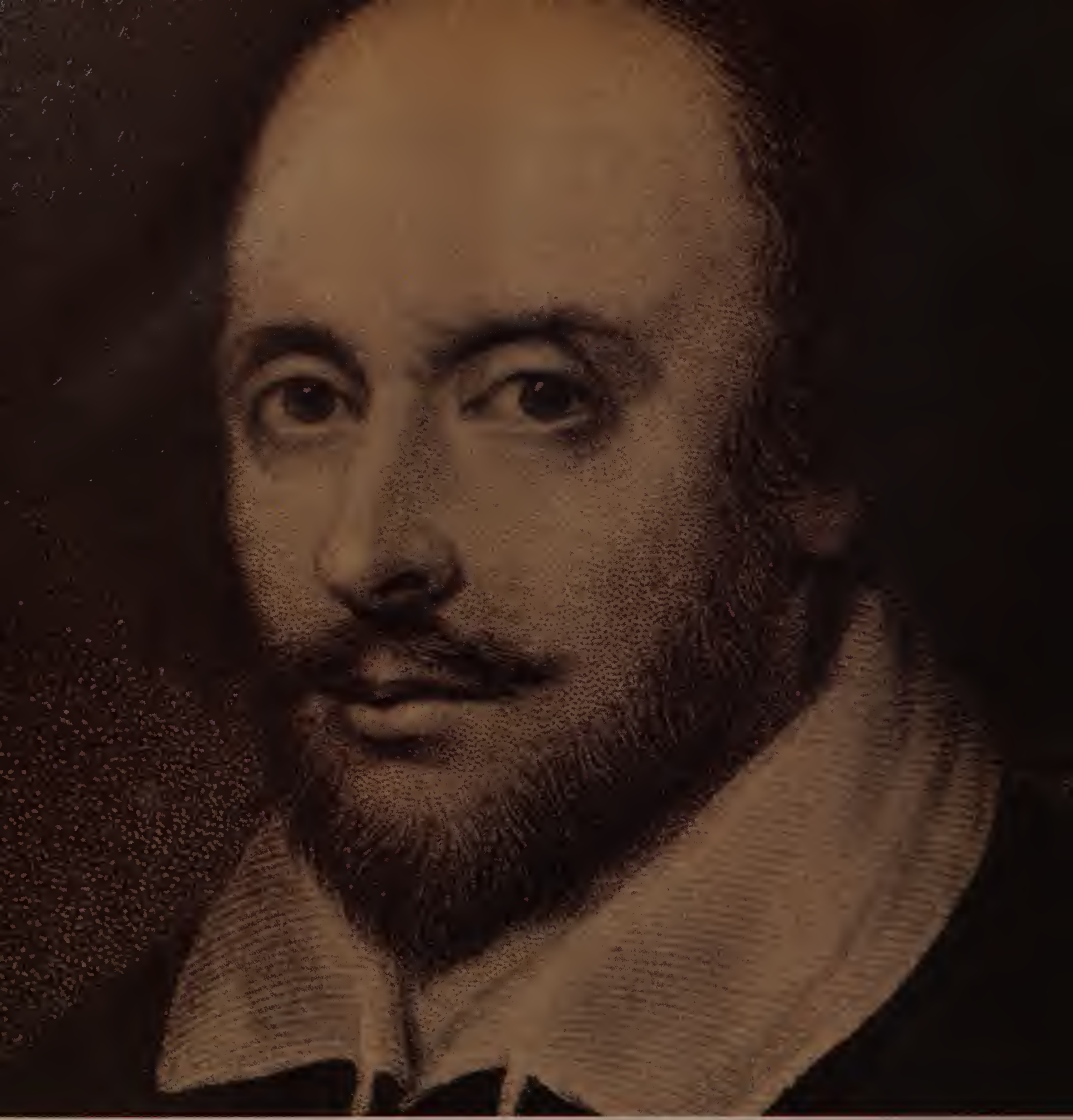
Two-Byte Dates

The date packing and unpacking subroutines shown in DATEPACK.BAS have proven useful when disk space is at a premium and data records must contain several dates. DATEPACK.BAS compresses an 8-character string date into an integer value that can then be stored as a 2-byte field. The subroutine located at line 1150 reverses the process and returns an 8-character string from the integer form of a date. A total of four variables (DX$, DX%, DW$, DW%) is used and should not be used elsewhere in the calling program.

(continues on page 230)

```
  10 REM          DATE PACK AND UNPACK SUBROUTINES
  20 REM                    B. J. Komiske
  30 REM
  32 REM  Lines 40-120:  Program used to develop and
  33 REM  debug "DATEPACK.BAS" subroutines.
  34 REM
  40 CLS:PRINT TAB(3) "DATE PACK AND UNPACK TEST":PRINT
  50 PRINT "PRESS RETURN FOR UNKNOWN DATE"
  60 PRINT "ENTER `Q' TO END RUN":PRINT
  70 INPUT "ENTER A DATE [mm/dd/yy] ", DX$
  80 IF DX$="" THEN 90 ELSE IF INSTR("Qq",DX$) > 0 THEN END
  90 GOSUB 1000:IF DX%<>0 THEN 100
  95 PRINT:PRINT DX$ " IS NOT A VALID DATE":PRINT:GOTO 50
 100 PRINT "INTEGER  DATE = " DX%
 110 GOSUB 1150:PRINT "RESTORED DATE =  " DX$
 120 PRINT :INPUT "PRESS RETURN TO CONTINUE",Q$:GOTO 40
 995 REM  ----------- VERIFY DATE & PACK INTO INTEGER ----------
 997 REM  Lines 1000-1090:  Verify that DX$ contains a valid date
1000 DX%=0:IF LEN(DX$)=0 THEN RETURN ELSE IF LEN(DX$)<>8 THEN 1050
1010 FOR DW%=1 TO 8:IF INSTR("1234567890",MID$(DX$,DW%,1))>0 THEN 1030
1020 IF DW%=3 OR DW%=6 AND INSTR("-/",MID$(DX$,DW%,1))>0 THEN 1030 ELSE 1050
1030 NEXT:DX%=VAL(DX$)
1040 ON DX% GOTO 1070,1080,1070,1060,1070,1060,1070,1070,1060,1070,1060,1070
1050 DX%=-1:RETURN
1060 DW%=30:GOTO 1090
1070 DW%=31:GOTO 1090
1080 DW%=28:IF VAL(RIGHT$(DX$,2)) MOD 4 = 0 THEN DW%=29
1090 IF VAL(MID$(DX$,4,2)) > DW% OR VAL(MID$(DX$,4,2)) < 1 THEN 1050
1095 REM  Lines 1100-1120:  Reformat date to "ddyym" where "m" is the
1096 REM  2nd digit of the month.  If month is Oct., Nov. or Dec. change
1097 REM  integer to negative.
1100 DW$=MID$(DX$,4,2)+RIGHT$(DX$,2)+MID$(DX$,2,1):DX%=VAL(DW$)
1110 IF VAL(DX$) > 9 THEN DX%=-DX%
1120 RETURN
1145 REM  ------- UNPACK INTEGER DATE INTO 8 CHARACTERS -------
1150 IF DX%=0 THEN DX$="        ":RETURN
1160 DX$="  /  /  ":IF DX%<0 THEN MID$(DX$,1,1)="1":DX%=-DX%
1170 DW$=STR$(DX%):IF LEN(DW$)<6 THEN DW$=" "+DW$
1180 MID$(DX$,2,1)=RIGHT$(DW$,1):MID$(DX$,4,2)=MID$(DW$,2,2)
1185 MID$(DX$,7,2)=MID$(DW$,4,2)
1190 DW%=INSTR(DX$," "):IF DW%>0 THEN MID$(DX$,DW%,1)="0":GOTO 1190
1200 RETURN
```

DATEPACK.BAS



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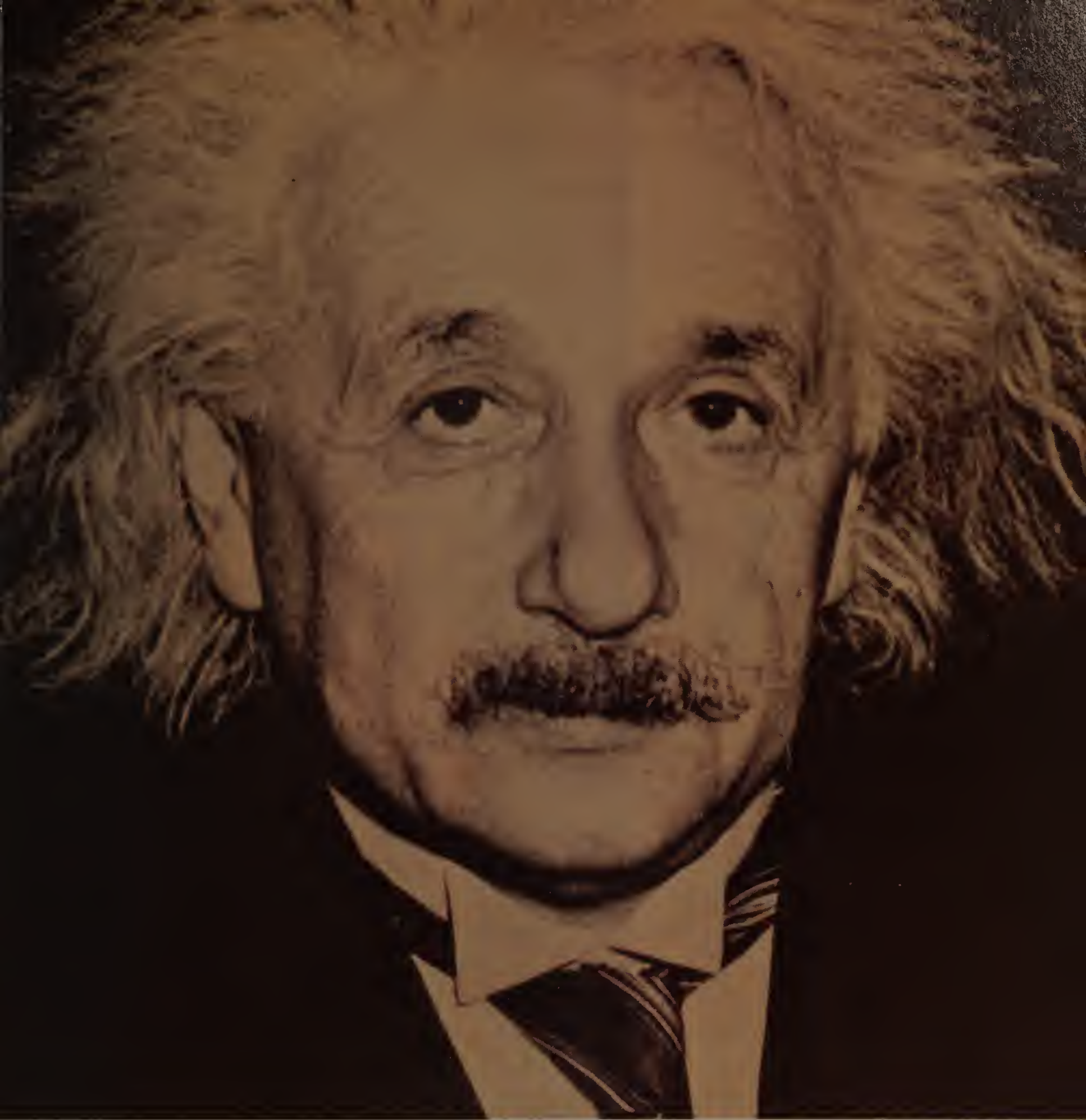

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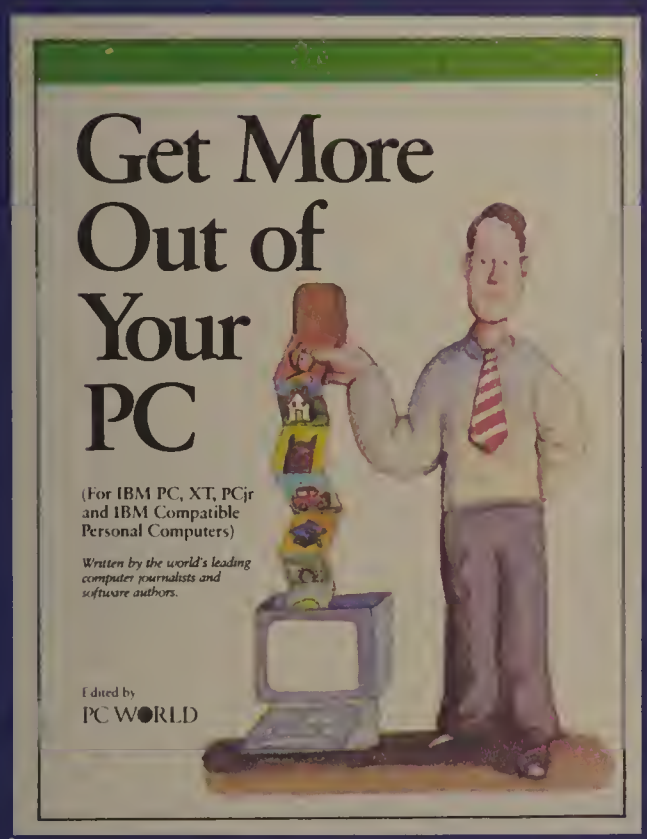

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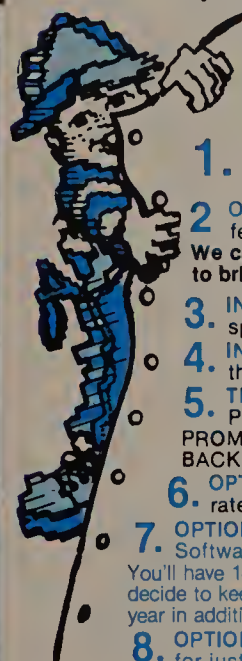

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To use the routines you must initialize DX$ with an 8-byte date string in the form *mm/dd/yy* (either a slash or a dash may be used as a separator) and then execute a GOSUB to line 1000. Upon return, the DX% variable will contain either a −1 to indicate that DX$ contained an invalid date or an integer that can be stored using the MKI$(DX%) function. To retrieve a date stored as an integer, use the CVI function to initialize DX% with the packed value, and then GOSUB to line 1150. An 8-character date in the form *mm/dd/yy* will be returned in DX$.

Barbara Komiske
Scottsdale, Arizona

DEBUG as an Assembler

I use the Assemble command in DEBUG as described by Roland Hutchinson ["Built-In Assembler," *.*, *PCW*, Vol. 2, No. 9], but I also take advantage of the DOS 2.*xx* I/O redirection facility to mimic the operations of a conventional assembler.

I can use my word processing program to create a file that contains the commands and instructions shown in CTTYFIX.ASM (making sure that the file ends with DEBUG's Quit command). Then I type **DEBUG <CTTYFIX.ASM**

```
A>DEBUG DEBUG.COM
-A 2E80
xxxx:2E80 CALL   03AD
xxxx:2E83 PUSH   CX
xxxx:2E84 PUSH   AX
xxxx:2E85 PUSH   DX
xxxx:2E86 MOV    CX,0004
xxxx:2E89 CALL   051C
xxxx:2E8C POP    DI
xxxx:2E8D POP    ES
xxxx:2E8E POP    CX
xxxx:2E8F MOV    SI,2D3F
xxxx:2E92 MOV    AX,E9E8
xxxx:2E95 MOV    [SI],AX
xxxx:2E97 PUSH   CX
xxxx:2E98 PUSH   DI
xxxx:2E99 LODSB
xxxx:2E9A SCASB
xxxx:2E9B LOOPNZ 2E9A
xxxx:2E9D JNZ    2EBB
xxxx:2E9F PUSH   DI
xxxx:2EA0 MOV    BX,[DI]
xxxx:2EA2 DEC    DI
xxxx:2EA3 ADD    WORD PTR BX,03
xxxx:2EA6 ADD    BX,DI
xxxx:2EA8 CMP    BX,DX
xxxx:2EAA JNZ    2EB6
xxxx:2EAC PUSH   DX
xxxx:2EAD PUSH   AX
xxxx:2EAE CALL   0318
xxxx:2EB1 CALL   02B3
xxxx:2EB4 POP    AX
xxxx:2EB5 POP    DX
xxxx:2EB6 POP    DI
xxxx:2EB7 JCXZ   2EBB
xxxx:2EB9 JMP    2E9A
xxxx:2EBB CMP    SI,2D41
xxxx:2EBF POP    DI
xxxx:2EC0 POP    CX
xxxx:2EC1 JNZ    2E97
xxxx:2EC3 RET
xxxx:2EC4
-E 0396 80 2E
-N D.COM
-W
Writing 2E80 bytes
-Q
A>
```

DEBUGMOD

>**CTTYFIX.LST**, and DEBUG assembles the file into a .COM file and creates an .LST file similar to that generated by an assembler.

Files can contain assembly language pseudo-ops such as DB for defining bytes and semicolons for making comments. Note that, thanks to this use of the redirection facility, I can edit a file and reassemble it if there are any errors.

Another use of I/O redirection with DEBUG is to create an assembly language file (of sorts) from .COM and .EXE files. The key is to use the Unassemble command while the output is redirected to a disk file, then edit the file to remove extraneous data such as the segment address and offset that precedes each line of code. The resulting file can be commented using semicolons, edited, and then reassembled using DEBUG's assembler.

Richard Ranson
Selden, New York

New DEBUG Command

I have added the routine shown in DEBUGMOD to the DOS 2.*xx* version of DEBUG.COM, which allows the program to list cross-references for Jump and Call instructions. The format for the new command is X *range value*, where *range* is the usual "segment:offset offset" or "segment:offset L value" style used under DEBUG, and *value* is a number between zero and 0FFFFh that represents an address. When executed, all the Jumps and Calls referencing that address will be displayed.

I did not spend much time on the program and was unable to get it to work properly with .EXE files. For this reason, I suggest that you use a name other than DEBUG.COM so you can have both versions available.

Francois Lacoursiere
Montreal, Quebec, Canada

Editor's note: Anyone who corrects the program to work with .EXE files is encouraged to submit his or her work for publication in this column.

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ASHTON-TATE dBASE III $409
MICROSOFT MULTIPLAN $179
MICROSOFT MULTIMATE $299
MICROSOFT R BASE 4000 ..... $349
PEACHTEXT 5000 ..... $229
HAYES SMARTCOM II $79
CROSSTALK XVI $109
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PRINTERS

OKIDATA ML 82 A $299
OKIDATA ML 83 A $549
OKIDATA ML 84 P $689
OKIDATA ML 84 S $779
OKIDATA ML 92 P $395
OKIDATA ML 92 S $449
OKIDATA ML 93 P $615
EPSON RX 80T $249
EPSON RX 80FT $329
EPSON FX 80 ..... $449
EPSON FX 100 ..... $619
EPSON RX 100 ..... $419
EPSON LQ 1500 ..... $1045
STAR GEMINI 10X 120 CPS $279
STAR GEMINI 15 ..... $399
TOSHIBA 1351 ..... $1351
TOSHIBA 1340 ..... $729
RITEMAN A-1 120 CPS, 3" High, ... $349
80 Column "Epson Like" printer
SILVER-REED 500 ..... $325
SILVER-REED 550 ..... $439
DIABLO 630 ..... $1595
Tractor for 630 ..... $140
C. ITOH 8510-BCD $359
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C. ITOH STARWRITER $975
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MODEMS

HAYES SMART MODEM 300 ..... $209
HAYES SMART MODEM 1200 ..... $469
HAYES SMART MODEM 1200 B $399
for IBM
NOVATION SMART-CAT 103 ..... $209
NOVATION SMART-CAT 103/212 ..... $459
NOVATION APPLE-CAT II $249
ANCHOR VOLKSMODEM $79
300 Band. Original-Answer Mode with Subscription to the Source
ANCHOR MARK VII $139
300 Band. Auto Answer. Auto Dial. Direct Connect wiht RS 232. Includes Cable and power supply.
ANCHOR MAKR XII 1200 Band Modem $239

DISKS

MAXELL DS/DD $29.95
VERBATIM DS-DD $29.95

DISK DRIVES

TANDON TM 100-2 ..... $169
SHUGART SA-455 (or equivalent) $139
DS/DD 360 KB ½ Height Floppy (set of 2) $275
TEAC 55B $139
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Circle 865 on reader service card

Just Announced

An array of new PC products

Featured this month: a 32-bit coprocessor board, a high-resolution color graphics board, five computers, three modems, a Pascal compiler, a payroll accounting program, and a survey system.

Edited by Seth Novogrodsky

In the fast-paced personal computer marketplace *Just Announced* keeps you informed of the latest developments in IBM PC and compatible technology. Information for this department is provided by manufacturers; these write-ups are not reviews. *Just Announced* does not evaluate products or corroborate manufacturers' claims. Some descriptions may be followed up by reviews in future issues.

Hardware

Boards

Tiger-32
A single-slot add-on coprocessor board designed for users seeking mainframe computational capabilities, Tiger-32 features an NSC-32032 true 32-bit microprocessor with a 32082 demand-paged virtual memory management unit (MMU), 512K of RAM, and Xenix 3.0, an implementation of the UNIX operating system. Xenix provides record and file locking, making the board appropriate for multiuser applications, with a hard disk strongly recommended. The microprocessor has a 32-bit data bus; with the MMU it enables each program to address up to 16MB, although only 512K needs to be present. The memory on the board can be used as standard expansion memory, or it can be segmented into increments of 256K for a RAM disk with a capacity of up to 2MB. To attain faster processing, the PC's 8088 CPU remains in operation as an I/O processor when used with the manufacturer's supplied virtual I/O handling program, which runs under DOS. The board's options include an NSC-32081 floating-point unit, 1MB or 2MB of RAM using 256K memory chips instead of the standard 512K using 64K chips, and a 10-MHz clock. Another version of the board is available with an 8-MHz 32016 with a 16-bit data bus. List price: $2495 ($2195 without Xenix), NSC-32081 option $150, 10-MHz option $300, socketed RAM $250, 1MB of RAM $1995, 2MB of RAM $4995.
DFE Electronic Data Systems
Singerstrasse 3
BRD-7513 Stutensee 1, West Germany
011-49/7244-9011 from USA

Chromagraphic I
A high-resolution color graphics board primarily for computer-aided design and graphics software development, the Chromagraphic I provides a 16-color 640- by 408-pixel display at a 60-Hz flicker-free refresh rate. The board contains a Graphic Display Controller (GDC) chip that provides high-speed line drawing, arcs, characters, and other graphics output. A direct-drive RGB video port is provided through a standard 9-pin D-shell female connector. List price: $800.
Chromagic
128 Sudbury Dr.
Milpitas, CA 95035
408/946-1665

Computers

ADDS PC/I, ADDS PC/II

The first personal computers marketed by Applied Digital Data Systems, a subsidiary of NCR Corporation, the ADDS PC/I and PC/II are designed to be compatible with the IBM PC and PC XT. Both computers feature an 8088

ADDS PC/I, Applied Digital Data Systems

CPU, 256K of RAM, a keyboard having the IBM PC layout and indicator lights for the <NumLock> and <CapsLock> keys, a color graphics board, serial and parallel ports, an 8087 coprocessor socket, five expansion slots, MS-DOS 2.11, GW BASIC, and built-in self-diagnostics software. The standard ADDS PC/I configuration includes two 360K floppy disk drives; the standard PC/II includes one 360K floppy disk drive and a 10MB hard disk. An optional monochrome monitor is available. List price: standard PC/I (256K, two disk drives, keyboard, and monitor) $2650, without monitor $2445; standard PC/II with 10MB hard disk $4200, without monitor $3995.
Applied Digital Data Systems, Inc. (ADDS)
100 Marcus Blvd.
Hauppage, NY 11788
516/231-5400

AJ Passport/MBA

Made for private labeling by Tele-Video Systems and intended for the professional business user, the AJ Passport/MBA desktop computer comes with integrated management software that includes a word processor, a spreadsheet, a report generator, business graphics, and data base management programs plus the TeleDOS operating system and GW BASIC. Designed to be both hardware and software compatible with the IBM PC, the computer has 256K of RAM, two 360K disk drives, five internal expansion slots, one RS-232C and one RS-422 serial port, one parallel port, a 12-inch amber display with tilt and swivel, RGB and composite video output, and an IBM-compatible keyboard. List price: $2995.
Anderson Jacobson
521 Charcot Ave.
San Jose, CA 95131
408/945-9030 ext. 2616

Columbia Professional, Columbia Data Products

Columbia Professional

The Columbia Professional, designed to compete with the Compaq Deskpro and to be fully compatible with the IBM PC and XT, features 640K of RAM, a 10MB hard disk, a 10MB internal tape backup, two floppy disk drives, a color graphics board, a parallel printer port, two serial ports, and four free expansions slots (eight total). Also provided are DOS 2.10 and applications software including a word processor; a spelling checker; a filer; a spreadsheet; a data base manager; communications, home accounting, graphics, and diagnostics programs; and four tutorials. Service is provided by Bell & Howell. List price: $5995.
Columbia Data Products, Inc.
9150 Rumsey Rd.
Columbia, MD 21045
301/992-3400

Mega PC

A PC-compatible multiuser computer system, the Mega PC supports up to eight single-user work stations. The system unit houses a main file-server board that contains an 8088 microprocessor and 256K of RAM (expandable to 512K) for controlling all input and output. The unit has 11 PC-compatible expansion slots, 8 of which can be used for Applications Processor Cards (APCs) that control the Corona work stations. Each APC contains an 8-MHz 8088-2 microprocessor for fast processing, a serial port, and 256K of

Mega PC, Corona Data Systems

RAM (expandable to 512K). Other system features are a hard disk controller board with a clock/calendar; a 10MB, 20MB, or 40MB hard disk; a 16K ROM BIOS that activates the hard disk; a floppy disk drive; a serial port; and a parallel port. Options include a second hard disk, a 10MB

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818/706-1186

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removable cartridge hard disk, and a 43MB streaming-tape drive. Each work station terminal consists of a 14-inch green phosphor nonglare monitor with 640- by 200-pixel graphics and a detachable 83-key keyboard with the IBM PC layout and indicator lights for the <NumLock> and <CapsLock> keys. MS-DOS, GW BASIC, and an integrated productivity package come with the system. List price: two-user system (256K per user) with 10MB hard disk $7805, each additional work station, including the APC $1495.
Corona Data Systems, Inc.
275 E. Hillcrest Dr.
Thousand Oaks, CA 91360
800/621-6746, 805/495-5800

Modems

Cat Communication System
A communications package available in two versions, the Cat Communication System includes either an internal or external Smart-Cat Plus 300/1200-bits-per-second (bps) modem plus software (for either CP/M-86 or MS- or PC-DOS). The modem is compatible with Hayes commands and has additional commands as well. The internal modem plugs into a slot in the PC, the XT, or a hardware-compatible computer. The external modem plugs into a serial port and also works with the PCjr. List price: $499.
Novation, Inc.
20409 Prairie St.
Chatsworth, CA 91311
800/423-5419, 818/996-5060

Cat Communication System, Novation

Cermetek 1200
A Hayes-compatible 110/300/1200-bps external modem, the Cermetek 1200 enables the user to automatically dial, answer, or select the data transmission rate directly from the keyboard or from supported communications software. The modem has an internal speaker with adjustable volume for monitoring a call's progress and can also send silent status messages such as CONNECT, BUSY, RINGING, and VOICE directly to the screen. Two front-panel buttons on the modem can be used to switch between voice and data on the same line. The modem also supports 1200-bps synchronous communications. List price: $595.
Cermetek Microelectronics, Inc.
1308 Borregas Ave.
P.O. Box 3565
Sunnyvale, CA 94088-3565
408/752-5055

ProModem 1200
The ProModem 1200 is a Hayes-compatible 300/1200-bps modem with a built-in clock/calendar. It features auto-answering and auto-

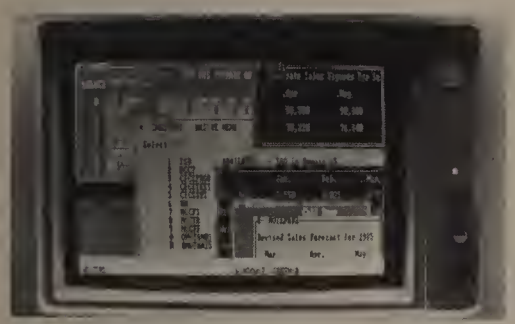
ProModem 1200, Prometheus Products

dialing, tone and pulse dialing, a built-in speaker with volume control, separate phone and data jacks to permit switching between voice and data, and built-in diagnostics. An optional buffer board with up to 64K of RAM is available and contains 2K of battery backup CMOS RAM to preserve time, date, operating parameters, and other data when the power is off. An optional 12-character alphanumeric display shows operating status, phone numbers, diagnostic messages, and time and date information. List price: $495, buffer board $99, alphanumeric display $99.
Prometheus Products, Inc.
45277 Fremont Blvd.
Fremont, CA 94538
415/490-2370

Network Devices

3270-PC Connection

An add-in interface board and software package that enables the PC to emulate the features of an IBM 3270-PC, the 3270-PC Connection allows you to alternate between host and PC applications, transfer data to and from the host, and interact with several host applications concurrently, using multiple windows. The board can be used as a coaxial connection for attachment to IBM 3274 cluster controllers and as a modem connection for remote attachment



3270 PC Connection, CXI

emulating an IBM 3274. The 3270-PC Connection concurrently displays up to five interactive host application windows, a PC-DOS window, and two note-pad windows. Information can be transferred from one window to another. List price: $1495.
CXI, Inc.
3606 W. Bayshore Rd.
Palo Alto, CA 94303-4229
415/424-0700

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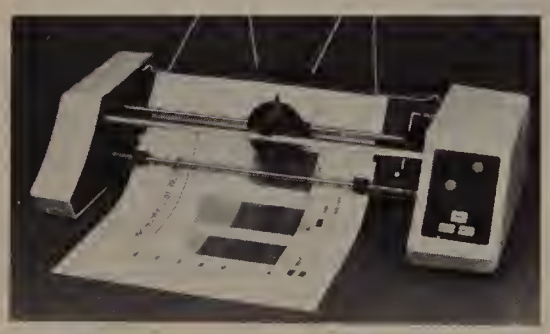
Plotters

PC Plotter 595 and 695
Designed for professionals in business, education, engineering, and architecture, these plotters feature a four-pen carousel for producing multicolored graphics on either quality bond paper or overhead transparencies. Both plotters produce 8½- by 11-inch graphics; the 695 model also produces 11- by 17-inch graphics. Each model has a serial interface, a resolution of



PC Plotter 595, Houston Instrument

.004 inches, and a pen speed of up to 4.2 inches per second. List price: PC Plotter 595 $595, PC Plotter 695 $695.
Houston Instrument
P.O. Box 15720
Austin, TX 78761
800/531-5205, 512/835-0900

Printers

Colourjet 132
A 36-color ink jet printer from Great Britain that has a resolution of 252 dots per inch, the Colourjet prints 132 columns in compressed

Colourjet 132, Integrex

mode and 80 columns in standard mode. Other features include double-width, double-height, and double-size printing; underlining; italics; and programmable foreground and background colors. A parallel interface is standard, and RS-232C and FSK interface boards are optional. List price: $795.
Integrex, Inc.
233 N. Juniper St.
Philadelphia, PA 19107
215/568-9681

GP-550
Featuring a two-hammer design, the GP-550 printer prints both standard draft and near letter quality characters at 86 and 43 cps, respectively. Six character sizes are available in both modes: pica, expanded pica, elite, expanded elite, condensed, and expanded condensed. Italic, subscripts and superscripts, and proportional spacing are available in near letter quality mode. A 9- by 8-dot matrix is used in draft mode, and a 9- by 16-dot matrix is used in near letter quality mode. Sixteen vertical dots are used in graphics mode. The GP-550 accommodates three copies, including the original on fanfold (from 4.5 to 10 inches) or cut-sheet paper, and is used with a cassette-type ink ribbon that has a replaceable ink cartridge. A special version of this printer, the GP-550PC, is configured specifically for the IBM PC. List price: $299.
Axiom Corp.
1014 Griswold Ave.
San Fernando, CA 91340
818/365-9521

Spinwriter 8850
The Spinwriter 8850 is a letter quality thimble printer that offers automatic proportional spacing, bold and shadow printing, margin justification, and centering. This 55-cps printer, which is compatible with the Spinwriter 3550 and 2050, prints bidirectionally at 550 words per minute. More than 60 print thimbles are currently available. The printer connects to a parallel port. List price: $2495.
NEC Information Systems, Inc.
1414 Massachusetts Ave.
Boxborough, MA 01719
617/264-8000

Miscellaneous

Screenshooter
A device for taking photographs and slides of the monitor screen, Screenshooter includes a Polaroid One Step 600 camera, a CRT hood, a CRT hood adapter, a diopter lens, and a 35mm camera

Screenshooter, NPC Photo Division

adapter. The Polaroid One Step 600 automatically determines camera exposure, but if you use a 35mm SLR, the camera's built-in metering system determines the exposure. List price: $169.
NPC Photo Division
1238 Chestnut St.
Newton, MA 02164
617/969-4522

PC Monitor Tilt
PC Monitor Tilt is a monitor stand that is compatible with most PC monitors. It has a low-profile platform that tilts forward or backward up to 20 degrees and rotates 360 degrees. The stand is designed to increase viewing comfort, reduce glare, and minimize the strain associated with monitor viewing. List price: $29.95.
Omnium Corp.
201 N. Second St.
P.O. Box 186
Stillwater, MN 55082
612/430-2060

PC Monitor Tilt, Omnium

System Software

Languages

Professional Pascal
A Pascal compiler that resides in RAM, Professional Pascal is designed to produce optimized code and features user-selected strict ANSI-standard error checking, varying-length strings (up to 64K), large set sizes (up to 64K elements), three precisions of integer and floating-point arithmetic, IEEE floating point, support for an 8087 coprocessor, and sophisticated user-error reporting and recovery. An extensive library of run-time routines and utilities is included. List price: $875. Requirements: 225K, 1.2MB hard disk.
Microtec Research, Inc.
P.O. Box 60337
Sunnyvale, CA 94088
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Utilities

Mylstar's Symbolic Debugging (MSD)
The *MSD* program uses the same command structure as DEBUG and allows the substitution of symbol names and mathematical expressions for hexadecimal values. The program includes commands for breakpoint editing, repetitive loops, input/output redirection, on-line help, and multicommand macros. List price: $125. Requirements: 128K, one disk drive, DOS (with DEBUG.COM).
Mylstar Electronics
165 W. Lake St.
Northlake, IL 60164
312/562-7400

Application Software

Accounting and Inventory

Crystal Payroll Package
A payroll accounting package, *Crystal Payroll* features display forms, windowing, and complete tax reporting. After you enter employee hours, the program computes wages and prints paychecks. *Crystal Payroll* can compute up to ten types of wages, including regular, overtime, vacation, and sick leave. Wages can be calculated at hourly, flat, nondollar amount (for automobile allowances or trips), commission, or unit piece rates. The program takes up to ten voluntary deductions. List price: $295. Requirements: 128K, two disk drives, DOS 2.00 or 2.10, 132-column printer.
Software Resource Center
3100 Broadway #203
Boulder, CO 80302
303/443-5528

PC-General Ledger
PC-General Ledger is a user-supported accounting package designed for easy use. Features include a cash receipts journal, a check register, journal entries, trial balance, financial statements, and check printing. Suggested contribution: $50 including enhancements, updates, telephone support, and manual. Requirements: 128K, two disk drives.
Charter Software
P.O. Box 70
Monticello, IL 61856
217/762-7143

Business Management

Expert Choice
As a decision support system for individuals and groups, *Expert Choice* provides a structured approach to organizing and communicating the decision-making process. The program accommodates both quantitative data and subjective judgments. *Expert Choice* lets decision makers graphically portray a complex problem in hierarchical form. List price: $495. Requirements: 128K, one disk drive.
Decision Support Software, Inc.
1300 Vincent Pl.
McLean, VA 22101
703/442-7900

CRIS
CRIS is a conference management program that maintains an unlimited number of participant records, tracks up to 100 conference events for groups, and schedules up to five meals or special functions a day for up to six days. **CRIS** manages several types of fees and payments, plus 26 types of registrations. Users can ask specific questions and tabulate responses. The program can produce reports and mailing labels. List price: $700. Requirements: 128K, two disk drives.
Applied Humanomics, Inc.
1421 Chapala St.
Santa Barbara, CA 93101
805/965-0555

Communications

A.C.E.
An integrated family of asynchronous communications emulators, *A.C.E.* enables an IBM PC or compatible system to emulate the characteristics of the Honeywell VIP7200, VIP7301, or VIP7303 terminals. Terminal configuration options are menu-driven, and help screens are available. The programs provide data capture and transmission features and operate at up to 9600 bps.

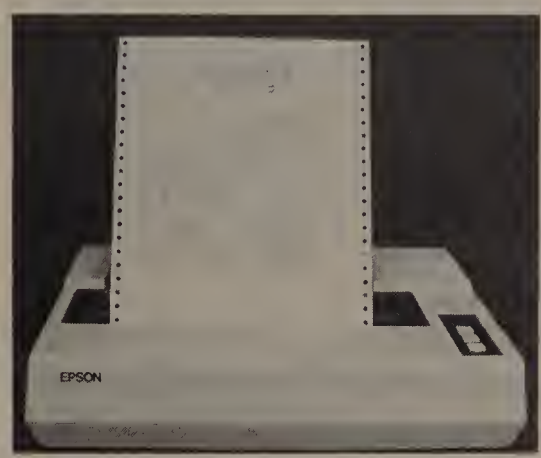
List price: $295. Requirements: 128K, one disk drive.
Insurance Technology Consultants
P.O. Box 6610
Fullerton, CA 92634-6610
714/773-1754

Educational

Customer Interaction Skills
Customer Interaction Skills is a course designed to complement technical training for service technicians by teaching communications and customer relations skills. Service managers and other personnel who interact with customers directly or by telephone may benefit from the course. List price: $250; $795 for 6-Pak, including text material for six people and a facilitator package containing two sets of disks to be shared plus training instructions. Requirements: 128K, color graphics board.
Concourse Corp.
2626 E. 82nd St. #215
Minneapolis, MN 55420
612/854-8848

Graphics

Plot88
Plot88 is a graphics program designed for engineers, scientists, and programmers familiar with line graphics packages on mainframe computers. Modules include PLOT, PLOTS, SYMBOL, and NUMBER. The program provides pen-plotter emulation on IBM and Epson printers, the screen, and the Tektronics 4025 graphics terminal and constructs high-resolution



Plot88, Plotworks

drawings on the HP 7470A or HP 7475A graphics plotters. *Plot88* produces charts, graphs, and annotated contour maps with text drawn in varying sizes at any angle. The program includes an integrated set of subroutines for creating grids and contouring two-dimensional surface data. List price: $250. Requirements: 64K (128K for some routines), Microsoft FORTRAN.
Plotworks, Inc.
P.O. Box 12385
La Jolla, CA 92037-0635
619/457-5090

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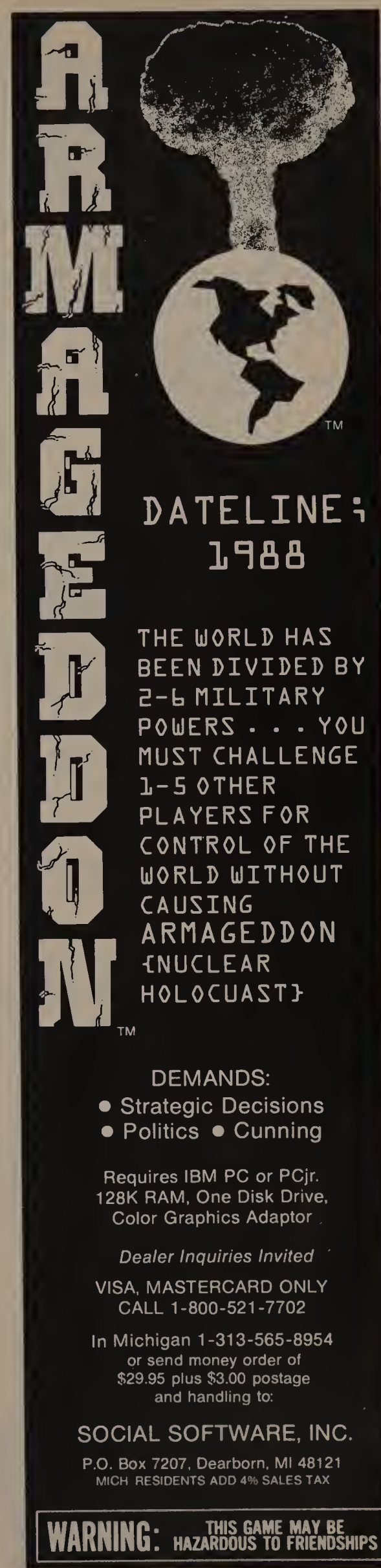

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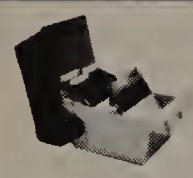

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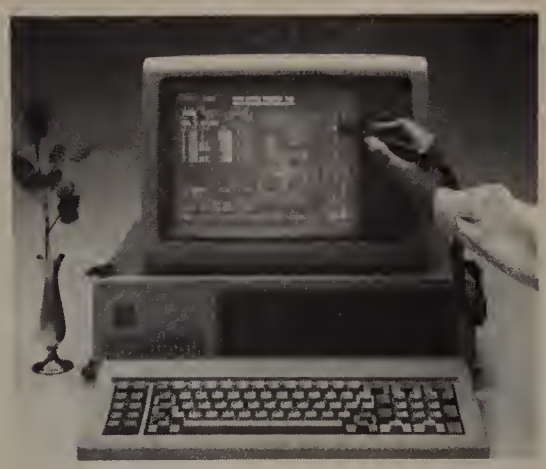

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1. PC World Magazine, Pub. No. 07378939
2. Date of Filing: October 25, 1984
3. Published monthly except bimonthly in July and December
3A. No. of issues published annually: 14
3B. Annual subscription price: $24.00
4. Known office of publication: 555 De Haro St., San Francisco, CA 94107
5. Complete mailing address of the headquarters of general business offices of the publisher: PC WORLD COMMUNICATIONS, INC., 555 De Haro Street, San Francisco, CA 94107
6. The names and address of the publisher, editor and managing editor are:
Publisher: David Bunnell, PC WORLD COMMUNICATIONS, INC., 555 De Haro Street, San Francisco, CA 94107
Editor: Andrew Fluegelman, 555 De Haro Street, San Francisco, CA 94107
Managing editor: Harry Miller, 555 De Haro Street, San Francisco, CA 94107
7. The owner is: CW COMMUNICATIONS, INC., Patrick McGovern, 5 Speen St., Framingham, MA 01701
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Actual no. copies of single issue published nearest to filing date: A Total no copies (net press run), 417,000; B. Paid and/or requested circulation 1. Sales through dealers and carriers, street vendors and counter sales, 67,160; 2. Mail subscription (paid and/or requested), 214,057, C. Total paid and/or requested circulation (sum of 10B1 and 10B2), 281,217, D. Free distribution by mail, carrier or other means samples, complimentary, and other free copies, 28,285; E Total distribution (sum of C and D), 309,502; F Copies not distributed 1. Office use, left over, unaccounted, spoiled after printing, 38,658, 2. Return from News Agents, 68,840; G. Total (sum of E, F1 and 2–should equal net press run shown in A), 417,000

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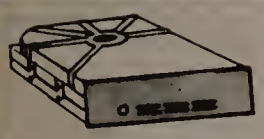

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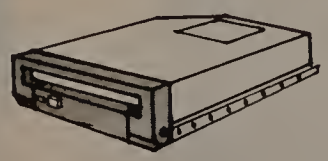

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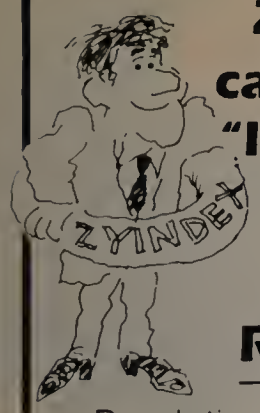

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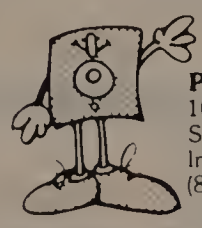

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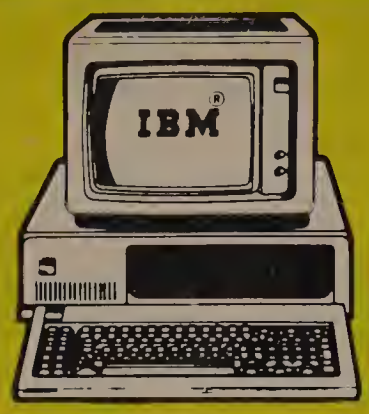

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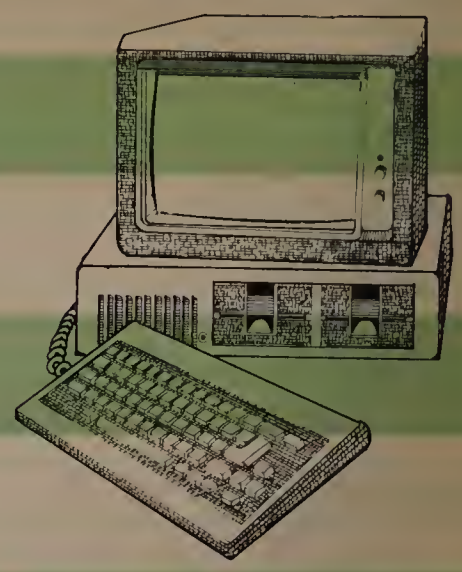

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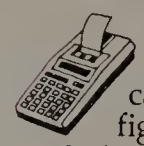

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